THE IRON TRADE REVIEW

Volume XL CLEVELAND, MARCH 28, 1907 Number 13

NO CURTAILMENT

IN RAILWAY BUYING IS REPORTED.

One Road Makes Second Addition to Rail Tonnage.—Pig Iron Market Stronger.—Finished Lines Active.

Great activity in getting into commission the many blast furnaces and steel plants flooded in the preceding week in the Pittsburg district has resulted in all of the blast furnaces and nearly all of the mills resuming operations. There is, however, a scarcity of semi-finished material. For that reason some mills are turning out considerably less than their normal product and a few are idle.

Railroad Buying

In spite of all the rumors that railroads will curtail buying, very little decrease either in new business or in specifications against contracts on the part of railroad companies is reported, and an important eastern railway has made a second addition to rail tonnage originally ordered. Building prospects are bright and are expected to require very large tonnages of shapes in the near future. Prices of sheets to jobbers for the third quarter will be the same as for the second quarter. Delivery of sheets does not show any improvement. Heavy specifications from steel car interests on plate contracts are being received, and the plate situation is extremely strong. Premiums are freely paid.

Premiums for Bars

The demand for steel bars is very active and deliveries are far behind. Premiums offered to principal producers for prompt delivery have been refused on account of inability to make delivery on contracts. The demand for wire products continues to be exceedingly heavy. The American Steel & Wire Co. will construct in Cleveland a hot mill for rolling thin flats and a wire mill for drawing wire for the manufacturing trade. The plant will also produce bale ties for the market. It is expected that work will commence within a few weeks. Indications point to increased activity in the scrap market. Prices are firm and in some cases higher.

Pig Iron Is Firmer

The heavy buying last week by the Carnegie Steel Co. and the Cambria Steel Co. and the announcement that their requirements are not yet satisfied, strengthened the market for Bessemer pig iron and sympathetically the foundry iron market is considerably firmer. Bessemer pig iron has advanced from 50 cents to $1 per ton for second quarter delivery. In the southern market, $18.50 Birmingham for No. 2 is the lowest quotation for the last half delivery, and the $19 quotation is more frequent. In the east and central west, important furnace interests have no foundry iron for sale except for last quarter delivery. In the east, large electric and sewing machine interests have been included in the buyers and it is believed that in the central west some of the leading melters will soon be in the market. Few sales of large tonnages are reported, but there is more inquiry in all centers for last half iron.

NEW COLORADO FUEL & IRON PRESIDENT.

(Special Telegram.)

New York, March 27.—The election of Jessep Wellborn to the presidency of the Colorado Fuel & Iron Co. to succeed the late Frank J. Hearne, was announced yesterday. Mr. Wellborn has been in the employ of the Colorado Fuel & Iron Co. for 17 years, and at the death of Mr. Hearne was vice president and sales and traffic manager. He began as clerk with the company.

WRITE TO SECRETARY STRAUS.

One of the most important subjects discussed at the convention of the National Metal Trades Association held in Boston last week was the appointment of the trustees of the foundation for the Promotion of Universal Peace, resulting from the granting of the Noebel prize last year to President Roosevelt. Nine trustees are to be appointed three representing capital, three labor and three the general public. As President Van Cleave, of the National Association of Manufacturers pointed out, the Anthracite Strike Commission, although appointed by the president without the sanction of law, laid down some very important principles which have assisted greatly in the solution of labor problems in recent years. It is plain that the Peace Foundation, which was incorporated by the last congress, can accomplish much good if intrusted to men who really represent the best elements of society. It is highly important that the labor representatives shall not be merely labor agitators, but that they shall be men who really work at some trade, and do not spend their time traveling about the country promoting labor unions or advancing their own selfish interests. It is likewise important that the representatives of capital should be prominent men, like presidents or past presidents of organizations of business men which have had long experience in dealing with labor problems.

Although the sentiments expressed by Mr. Van Cleave were heartily applauded, no definite action was taken at Boston in regard to presenting the claims of organized manufacturers for recognition in the appointment of the trustees of the Peace Foundation, but it seems to us that much might be done by individual manufacturers writing to the Hon. Oscar S. Straus, secretary of commerce and labor, who is a member of the committee which will soon appoint the trustees of the Peace Foundation. Hence, we would urge all who are interested in the establishing of more satisfactory conditions in the industrial world to write to Mr. Straus and urge him to exercise great care in the selection of the trustees.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Rapid Recovery from Flood Conditions.—Crude Steel is Scarce.

Office of THE IRON TRADE REVIEW. }
521 Park Building, Mar. 27 }

The past week has been an extremely busy one from all points of view in the Pittsburg district, the chief endeavor having been to start plants put out of commission by the flood and so successful has the effort been that all the blast furnaces banked on account of the flood in this district are again in operation and but a very small percentage of the mills is still down. Specifications against contracts in the finished lines have continued unabated and the Wall street flurries have not yet had the effect of applying the brakes in this direction, and as far as can be learned the only cancellation has been on 7,500 tons standard rails by one of the Gould interests, this having taken place a month ago. The scarcity of semi-finished material has seriously handicapped many of the mills and it will be some little time before they can return to their average maximum production. The Humbert, Anderson and Morewood plants of the American Sheet & Tin Plate Co. are closed on account of lack of steel.

Pig Iron.—The big transactions of the Carnegie Steel Co. and the Cambria Steel Co., aggregating 60,000 tons of Bessemer iron for second quarter delivery and the announcement that they have not covered for their requirements even at these figures has practically cleaned up all the available Bessemer pig iron in the valleys for April and May, although there is still some available pig iron for June delivery. This cleaned up condition of furnace outputs has caused an advance of from 50 cents to $1 a ton for second quarter deliveries and during the past week an independent furnace sold 1,000 tons Bessemer for prompt delivery at $23 at furnace; 1,000 tons has been sold for April delivery at $23, valley, to western consumers and an equal tonnage at the same price to a Pittsburg steel melter. A sale of 3,500 tons to the Midvale Steel Co. for third quarter delivery at $22 valley is announced, but this does not represent the market, as the adjustment of another account entered into this contract. Northern No. 2 foundry iron for prompt delivery is strong at $25 valley and for second quarter $23.25 to $23.75 valley. Southern No. 2 foundry for prompt delivery is quoted $23 Birmingham, second quarter at $22 Birmingham and third quarter at $18.50 to $19 Birmingham. For second quarter delivery we quote as follows:

Bessemer, Valley	$22.50 to 23.00
Bessemer, Pittsburg	23.35 to 23.85
No. 1 Foundry, Pittsburg	24.35 to 24.85
No. 2 Foundry, Pittsburg	24.10 to 24.60
Gray Forge, Pittsburg	21.35 to 21.85
Basic, Valley	22.00 to 22.25
Basic, Pittsburg	22.85 to 23.10

Ferro-Manganese.—To all outward appearances the alloy market has strengthened to a considerable degree during the past week and for spot delivery foreign 80 per cent delivered in the Pittsburg district is quoted $76. For deliveries extending over the remainder of the year the market is strong at $72 Pittsburg. We quote imported 50 per cent ferro-silicon $112 Pittsburg, domestic 12 per cent, $36; 11 per cent, $35; 10 per cent, $34. The lower grades of imported, $1 higher.

Steel.—At the monthly adjustment by the leading interest, no price changes were made and sheet bars on monthly and quarterly contracts are quoted $30 Pittsburg. The scarcity of semi-finished material due to the shut-down of furnaces and blooming mills, while many finishing mills were unaffected during the flood, has become very acute and has affected some mills to the extent that they are running but 75 to 80 per cent of their capacity. This is not general, however. Soft Bessemer billets 4 x 4 and larger are quoted nominally at $29 to $29.50 Pittsburg and open-hearth $30.50 to $31.

Skelp.—There have been no new developments and leading producers are entirely out of the market as far as new business is concerned and are endeavoring to cut off some of their old contracts at expiration in order to better supply allied interests and constituent companies. We make the following nominal quotations:

Bessemer, grooved, 1.90c to 1.95c; sheared, 1.85c to 1.90c; basic, grooved, 1.90c to 1.95c; sheared, 1.85c to 1.90c; iron skelp, sheared, 2.15c to 2.25c; grooved, 2c to 2.10c.

Muck Bar.—As far as can be learned, there has been no movement in muck bar, and we quote $37.50 to $38 nominal on all pig metal bars and $36.75 on scrap bars.

Plates.—The two big steel car interests in this district during the past week have specified very heavily for their immediate requirements, but, aside from this, there has been nothing special of interest or note in the market. There are several fair sized Pacific coast inquiries and developments have shown that the Pacific differential made by the leading producers of steel plate and announced about a year ago as having been withdrawn is still effective and the 1.60c base Pittsburg price for this western business is in some instances still being quoted for far future deliveries. The heavy demand upon eastern plate makers since the Carnegie Steel Co. has been out of the market has so far booked them up that even at the premium prices they are unable to accept further business. We quote the following official nominal prices:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.70c f. o. b. mill Pittsburg. Light plate schedule, No. 10, 1.80c; Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c; extras on the regular plate schedule are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gages under ¼-inch to and including 3-16-inch plates on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—The American Sheet & Tin Plate Co. has resumed operations in most of its plants shut down by the flood, and is now accepting a large tonnage of third quarter and last half business. The best delivery promises made on any sheet products is fourteen weeks. The third quarter price to jobbers has been announced, being the same as second quarter prices and jobbers are coming in freely for their requirements, the manufacturers having been given an opportunity to cover same before the official jobbers' prices were announced. There has been no change in prices and we quote as follows:

Black steel sheets, one pass, cold rolled; Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvanized, Nos. 10-11, 2.65c; Nos. 12-14, 2.75c; Nos. 15-16, 2.85c; Nos. 17-21, 3.00c; Nos. 22-24, 3.15c; Nos. 25-26, 3.35c; No. 27, 3.55c; No. 28, 3.75c; No. 29, 4.00c; No. 30, 4.25c. Corrugated roofing, $1.85 per square for No. 28 painted, 2½-inch corrugation, and $3.25 per square No. 28

galvanized, 2½-inch corrugation. Blue annealed sheets, No. 10 and heavier, 1.85c; Nos. 11-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2.05c.

Tin Plate.—While the aggregate specifications have been heavy and up to normal, they have been spasmodic and irregular. There is very little unsold capacity in the market for second quarter delivery, and a large tonnage has been sold into the third quarter. We quote as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less two per cent for cash in 10 days.

Rails and Track Materials.—The new business in standard rails during the past week by the Carnegie Steel Co. amounted to 24,000 tons, of which 20,000 tons was for western and southwestern shipments. Specifications against existing contracts are coming in very freely and the only cancellation noted since the recent Wall street flurries and tight financial condition of the railroads has been 7,500 tons by one of the Gould interests. The booking of light rails during the past week has been light.

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $40; 12-pound, $36 to $37; 16-pound, $35 to $36; 20-pound, $34 to $35; 25 to 45-pound, $33 to $34; angle splice bars for standard sections, $1.65; spikes for forward deliveries, $2.50.

Hoops and Bands.—Specifications are to the full mill capacity, but the new business has been light and developments along this line are not expected until well into the second quarter of the year. We quote as follows:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c base, half extras as per standard steel.

Merchant Bars.—While the implement makers have not come out directly and asked for their usual concessions and steel bar producers have not therefore given a definite answer, the implement people have been trying indirectly to find out what they may expect when they are in position to place their yearly contracts between now and July 1. They have been given very little satisfaction, and the chances are very much against any concessions whatever. Bar iron is very strong at 1.80c Pittsburg for delivery in this territory and 1.65c base Pittsburg plus freight to point of delivery for western shipment. We quote as follows:

Common iron bars, 1.80c Pittsburg in carload lots and over; 1.85c in less than carloads; Bessemer steel bars, 1.60c, net; plow and cultivator, 1.60c, net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size 0.30c advance. Cold rolled and ground shafting, 50 per cent off in carload lots, and 5 per cent off in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. The price of planished and machine straightened tire is 1.80c, base, half tire extras. Iron finished tire up to 1½ inch and over to be sold on regular bar basis of 1.60c base, half extras, steel card.

Wire and Wire Nails.—Mills in this district put out temporarily by the flood are again in full operation, but it will take a month or six weeks to recover from the effects of their lost production in meeting the tremendously heavy specifications for wire products, outputs being at least one-half less than the specified requirements of buyers. Prices are unchanged as follows:

Wire nails, jobbers' carload lots, $2; retailers' carload lots, $2.05; less than carloads, $2.10; painted barb wire, $2.15, for jobbers in carloads; retailers in carloads, $2.20; and less than carloads, $2.30 with 30c for galvanizing; plain wire, $1.85 for jobbers and $1.90 by carload.

Merchant Pipe.—The sold up condition of pipe makers is probably worse than any other finished line and withdrawn quotations has started a flurry on the part of jobbers, who have not covered for their requirements and they are endeavoring to clean up everything in sight for deliveries during the next three months. There is a wide range of prices and in a general way mills are quoting 71 to 74 and five off as extreme discount on merchant pipe. There are several fair sized inquiries in the market for consumers, but as far as can be learned these orders have not been placed, and if accepted no delivery promises would be made. The following quotations are the nominal market, although not a fair basis for making quotations. The extreme discount quoted to consumers by independent mills is 74 and five off.

	—Steel—	
	black.	galv.
⅛ to ¼ inch	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches	73	63
7 to 12 inches	68	53
EXTRA STRONG PLAIN ENDS.		
⅛ to ¼ inch	58	46
⅜ to 4 inches	65	53
4½ to 8 inches	61	49
Double extra strong plain ends, ½ to 8 inches	54	43

Coke.—The Connellsville district has about recovered from the effects of the recent flood and the railroads are giving an ample supply of cars so that the shipments from the district are about normal. A little improvement is noticed in foundry coke, although furnace coke is moving slowly at the present time. One large steel-making interest, which has suspended shipments for about a month, will begin taking its supply again next week and remove a large tonnage of the spot coke from the open market. On furnace coke for spot delivery or for delivery during the balance of the year we quote $2.85 to $2.95 at the ovens, and foundry coke for spot shipment or delivery before July 1, $3.60 to $3.75, and for delivery during the balance of the year or last half $3.50 to $3.60.

Old Material.—The quiet condition of the past two or three weeks in the scrap market still continues, there being no noteworthy features, consumers being comfortable and apparently not at all anxious and playing a waiting game. Old material is scarce, there is little to be picked up and the yards of dealers are comparatively clean. Aside from the advance in turnings, prices are unchanged and for prompt shipment delivery in the Pittsburg district we quote as follows:

Heavy melting scrap, $18 to $18.50; rerolling rails, $19 to $19.50; bundled sheet scrap, $16.50 to $16.75; iron axles, $30.50 to $31; old iron rails, $23 to $23.50; No. 1 wrought scrap, $19.25 to 19.50; old car wheels, $24 to $24.50; low phosphorus scrap, $22.50 to $23; machine shop turnings, $15.75 to $16.25; axle turnings, $16.50 to $17; cast borings, $13.50 to $13.75; No. 1 cast scrap, $20.50 to $21.

CHICAGO.

Pig Iron Stronger.—Cast Iron Pipe Active.—Scrap Improves.

Office of THE IRON TRADE REVIEW.
1362 Monadnock Block, Mar. 26

New tonnage in iron and steel is not conspicuously active, but there is unmistakable evidence of strength in those materials that were inclined to weakness. This change is most clearly shown in pig iron. It is becoming increasingly difficult to secure spot shipments either from southern or northern furnaces, a fact which has aided in strengthening the market on all deliveries. No price changes have yet appeared other than a firm refusal to shade $23 Birmingham for spot southern No. 2 and an indisposition to go less than $18.50 Birmingham for last half. Finished materials bringing premiums for quick deliveries have increased by the addition of galvanized sheets. Manufacturers of this product are overwhelmed with orders and specifications, one producer having nothing to offer for the next four or five months, while the best deliveries obtainable from local mills is ten weeks.

The movement in structural steel improves with the lengthening of warm weather, and mills are rapidly filling with specifications.

Cast iron pipe was active this week, contracts closed aggregating 75,000 tons.

Since the withdrawal from the market on pipe and tubes for deliveries prior to July 1, by the National Tube Co., the new list of prices issued by the Youngstown Sheet & Tube Co. may be taken as representative of prevailing quotations on merchant pipe.

A round tonnage of steel bars has been placed with mills for delivery in the second half, in the past few days, but very little season business has been offered to date.

Scrap shows an upward trend, several grades have sustained advances. New lists aggregating 5,000 tons have been issued by the Grand Trunk and St. Paul railroads.

Pig Iron.—The evenness with which pig iron maintains its equilibrium in the face of so much bear talk and so many machinations, is one of the remarkable features of the situation. For a time, there were indications of a wavering attitude, but this has been overcome and the market now appears to be on the verge of an upward movement. Eighteen-dollar iron for the last half is so scarce as to be almost a negligible quantity in a review of the situation. The minimum price for the standard grades of southern No. 2 foundry for deliveries after July 1, is $18.50 Birmingham with an increasing tendency to ask $19. Spot shipments have been re-established firmly on the basis of $23 Birmingham for No. 2, and are hard to get at that price. For shipments during April, May and June the price ranges from $21.50 to $22.50, according to the delivery required. Two lots of northern iron for immediate shipment aggregating 1,000 tons were disposed of this week at prices ranging from $25.50 to $26.50, Chicago. No quotation can be secured on second quarter requirements, owing to the limited supply of iron offered for this delivery; but it is doubtful, in view of the idleness of so many lake furnaces and the recent large purchases in the valley by large steel makers, if any better price than the foregoing can be secured. For the last half, northern No. 2 foundry remains firm at $23.50 Chicago. Current inquiries are almost wholly limited to nearby deliveries, interest in the last half being of an apathetic nature. The largest inquiry now pending is from a local steel mill and involves 4,500 tons of basic iron for second and third quarter shipment. Our quotations below are for the last half, southern prices being on the basis of a $4.10 freight rate.

Lake Superior charcoal	$25.50 to 26.50
Northern Foundry No. 1	24.00 to 24.50
Northern Foundry No. 2	23.50 to 24.00
Northern Foundry No. 3	23.00 to 23.50
Northern Scotch Foundry	24.00 to 24.50
Ohio Strong Softeners No. 1	23.30 to 23.80
Ohio Strong Softeners No. 2	22.80 to 23.30
Southern Foundry No. 1	22.60 to 23.10
Southern Foundry No. 2	22.10 to 22.60
Southern Foundry No. 3	21.60 to 22.10
Southern Foundry No. 4	21.10 to 21.60
Southern No. 1 Soft	22.60 to 23.10
Southern No. 2 Soft	22.10 to 22.60
Southern Gray Forge	20.10 to 20.60
Southern Mottled	19.60 to 21.10
Southern Silveries, 4 per cent to 6 per cent Silicon	23.60 to 24.60
Jackson Co. Silveries, 8 to 10 per cent Silicon	30.30 to 32.30
Malleable Bessemer	23.50 to 24.00

Billets and Rods.—Trading in semi-finished materials is of a restricted nature. It is not a difficult matter to supply medium sized wants, but considerable shopping is required to place an order of over 100 tons. Forging billets are held firmly at a range of $36 to $38 Chicago, and wire rods at $35 to $36 Pittsburg for Bessemer.

Iron and Steel Bars.—There has been a fair amount of contracting for steel bars for delivery in the last half of the year by implement manufacturers. These interests are consuming material very rapidly, and at the rate of present specifications it can only be a matter of a few weeks before all last year's contracts are used up. Mills are not pressing hard for new business, being crowded with orders and greatly behind in shipments. The outlook for a concession on season's contracts is not very sanguine. No change is noted in bar iron, which remains at 1.65c Pittsburg. Specifications are active and new tonnage is good. We quote as follows:

Soft steel bars and bands, 1.76½c, half extras; soft steel angles less than 3 x 3, 1.86½c; hoops, 2.16½c base, full extras. We quote bar iron from stock 2.25c, full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base, steel bands, $2, half extras; soft steel hoops, 2.40c to 2.50c, full extras. Other sizes not mentioned above $2 per 100 pounds base plus half extras.

Plates.—New tonnage continues to pile up on mill order books. Specifications are heavy, and in the past two weeks demands for shipments have become more insistent. The Steel Corporation mills cannot promise deliveries within four to six months, though earlier shipments can be secured from other makers on payment of the required premium, which ranges from $1 to $2 a ton according to the nature of the business. We quote as follows:

Plates ¼ inch and thicker 6⅛ to 100 inches wide, either universal or sheared, 1.70c Pittsburg base. For extras, see Pittsburg report. Freight rate to Chicago, 16½c per 100 pounds. Jobbers' prices for shipment from local stocks are as follows: Tank steel ¼ inch and heavier up to 72 inches wide, 2.20c; 3-16 inch up to and including 60 inches wide, 2.30c; 3-16 inch 72 inches wide, 2.55c; No. 8 up to 60 inches wide, 2.35c. Flange steel, 25c extra; heads, 25c extra.

Sheets.—Price has almost ceased to be an object in the placing of new tonnage. Premiums as high as $4 and $6 a ton are offered for early delivery of galvanized sheets, and black sheets are only slightly less strong. The leading producer is reported unable to deliver new tonnage within fifteen to twenty weeks, and under present conditions it is doubtful if it will overtake its order books this year. From outside mills, the best shipment possible on either material, is eight to twelve weeks. We quote car load lots, as follows:

Black sheets Nos. 8, 9, and 10, 1.90c Pittsburg; No. 28 gage, 2.60c Pittsburg. Galvanized sheets No. 28 gage, 3.75c Pittsburg. Freight to Chicago 16½c per 100 pounds. Jobbers' prices on less than carload lots from store are as follows: No. 10, 2.25c to 2.30c; No. 12, 2.30c to 2.35c; No. 14, 2.35c to 2.40c; No. 16, 2.45c to 2.50c; Nos. 18-20, 2.70c to 2.80c; Nos. 22-24, 2.75c to 2.85c; No. 26, 2.80c to 2.90c; No. 27, 2.85c to 2.95c; No. 28, 2.95c to 3.05c; No. 30, 3.35c. Galvanized sheets, Nos. 10 to 20, 3.40c to 3.45c; Nos. 22 and 24, 3.55c to 3.60c; No. 26, 3.75c to 3.80c; No. 27, 3.95c to 4c; No. 28, 4.15c to 4.20c; No. 30, 5.35c to 5.40c.

Structural Steel.—Despite the reports of widespread cancellations of projected improvements by railroads, local mills report no reduction in either specifications or new tonnage from transportation sources. All the car and fabricating shops are working to capacity and are taking all the material they can get—in many cases anticipating contract quotas. Specifications upon the local mill are unusually free, and the best delivery now obtainable is two to three months. The only new contracts of importance are reported by the American Bridge Co., one being for 6,000 tons of fabricated shapes for the Illinois Central, and the other for 1,800 tons of shapes for the Taft & Pennoyer building, San Francisco. Prices are without change as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from that city to Chicago is 16½c per 100 pounds. Quotations from stores are as follows:

All angles, three inches and larger, including six inches, $2.05 to $2.10 per 100 pounds; angles over six inches, $2.15 per 100 pounds base, beams, three inches to 15 inches, inclusive, $2.05 to $2.10 per 100 pounds base; channels, three inches and larger, $2.05 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—Inquiry for rails from traction sources is quite brisk. Only a small portion develops into actual orders, however, mills be-

ing unable to meet the delivery requirements on most of the offers. Relayers are enjoying a brisk demand and are firm at $30 to $32 for standard sections subject to inspection. Spikes, bolts and nuts continue in good demand, and for early shipments are high and stiff. We quote as follows:

Bessemer rails, $28 to $30; less than 500-ton lots, $32; open-hearth rails, $29; light rails, Bessemer, 30 to 45-pound sections, $35; 25-pound, $36; 20-pound, $37; 16-pound, $38; 12-pound, $39, and lighter sections down to 8-pound, $45.50, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. Angle bars in large lots are quoted 1.65c to 1.75c; for smaller quantities, 2.25c to 2.75c; spikes, large lots, 2.40c; for smaller quantities, 2.60c; bolts, large lots, 2.75c; smaller lots, 2.85c with square nuts, and 3c with hexagon nuts.

Merchant Steel.—There is no perceptible change in conditions surrounding the production and distribution of the products listed below. Specifications exceed output and deliveries are falling behind. We quote as follows:

Planished or smooth finished tire steel, 1.96½c; iron finish, up to 1½ x ½ inch, 1.91½c base; iron finish, 1½ x ½ inch and larger, 1.76½c base; channels for solid rubber tires, ¾ to 1 inch, 2.26½c, and 1⅛ inch and larger, 2.16½c; smooth finished machinery steel, 2.16½c; flat sleigh shoe, 1.81½c; concave and convex sleigh shoe, 2.06½c; cutter shoe, 2.35c; toe calk steel, 2.31½c; railway spring, 1.96½c; crucible tool steel, 6½c to 8c, with higher prices asked on special grades. Shafting is very strong. Quotations are without change at 50 per cent off in car lots and 45 per cent in less than car lots in base territory.

Cast Iron Pipe.—The American Car & Foundry Co. secured the contracts of the city of Detroit, Mich., for 6,000 tons, and of Toledo, for 500 tons. The material will be made at the Detroit plant of this company. The United States Cast Iron Pipe & Foundry Co. secured the Dayton (Ohio) order for 1,000 tons. No diminution is noted in the volume of small orders for extensions and betterments. Specifications also continue free. Prices for Chicago delivery, are as follows: Four-inch water pipe, $38.60; six to 12-inch, inclusive, $37.60; 16-inch and upward, $36.60; gas pipe, $1 a ton higher.

Merchant Pipe and Boiler Tubes.—The Youngstown Sheet & Tube Co. has issued a new list on merchant pipe, effective March 20, which as representative of the prices now being asked by all of the independent pipe manufacturers is given herewith. The list is as follows: Random lengths with thread couplings, ⅛ and ¼ inch, 65 per cent discount off for black and 49 per cent off for galvanized; ¾ inch to 6 inches, 73 per cent off for black and 63 per cent off for galvanized; 7 to 12 inches are quoted at 68 and 53, respectively. Extra strong plain ends are held at 58 off for black and 46 off for galvanized, in sizes from ⅛ to ⅜ inches, and at 61 and 49 respectively for 4½ to 8 inches.

Little hope is expressed that the National Tube Co. will overtake its delinquent tonnage by June 30, the delays incident to the Pittsburg flood, having further complicated the situation. The Wheeling mill is expected to be placed in operation early this week.

There is an active demand for pipe and tubes from store. Chicago jobbers are quoting 70 off for black steel pipe, ¾ to 6 inch, and iron pipe at four to five points higher. Boiler tubes from store are without change as follows: Steel 60 per cent off; iron and seamless, 47½ per cent off, base sizes.

Wire Products.—The movement of wire products continues of an unprecedented nature. Every section of the country is pressing for material, stocks being low and deliveries slow. Prices are well maintained, slight advances being secured in some instances on galvanized material. We quote jobbers' prices, Chicago delivery, as follows:

Wire nails, $2.15; painted barb wire, $2.30; galvanized barbed wire, $2.60; smooth annealed wire, $2.30; polished staples, $2.55. Carload lots to retailers, five cents higher; less than carload lots, 15 cents higher.

Coke.—The delays incident to the recent floods in the coke producing regions have strengthened the market. While there is no greater demand than formerly, much of the spot coke that was crowding the market and bearing prices has been absorbed. Connellsville foundry for spot shipment or for delivery prior to July 1, is now held at a spread from $3.60 to $3.75 ovens, and for delivery later in the year at $3.50 to $3.60 ovens. Solvay coke for early shipment ranges from $6.50 to $6.75 Chicago.

Old Material.—In sympathy with the stronger conditions in other materials, notably pig iron, the scrap market has been able to gather sufficient strength to shake some of the despondency out of its framework. It is only a slight improvement, and as yet, is not backed up by any increase in the consumptive demand, but it was sufficient to raise the price of one or two materials. Railroad wrought and old steel rails have both advanced 50 cents a ton. Car wheels and light and heavy cast scrap are also stronger, the former having advanced 50 cents a ton. We quote as follows, gross tons being mentioned in the first paragraph:

Old Steel Rails (3 feet and over)	$19.50 to 20.00
Old Steel Rails (less than 3 feet)	18.50 to 19.00
Old Car Wheels	24.50 to 25.00
Old Iron Rails	25.00 to 26.00
Light Section Relayers, 45 lbs. and under, subject to inspection	30.00 to 32.00
Relaying Rails, subject to inspection	31.00 to 31.50
Frogs, Switches and Guards	16.50 to 17.00
Heavy Melting Steel	16.00 to 16.50
Mixed Country Steel	12.50 to 13.00

We quote net tons as follows:

No. 1 R. R. Wrought	$15.50 to 16.00
No. 2 R. R. Wrought	14.50 to 15.00
Shafting	17.00 to 17.50
Dealers Forge No. 1	12.00 to 12.50
Wrought Pipe and Flues	12.00 to 12.50
No. 1 Cast, 150 lbs. and less	19.00 to 20.00
No. 1 Mill	10.00 to 10.50
Mixed Busheling (No. 1 & No. 2)	11.00 to 11.50
Country Sheet	8.50 to 9.00
No. 1 Boilers Cut	11.50 to 12.00
Boiler Punchings	15.00 to 16.00
Iron Car Axles	26.50 to 27.00
Steel Car Axles	21.00 to 21.50
Iron Axle Turnings	11.50 to 12.00
Cast Borings	9.25 to 9.75
Mixed Borings, etc	9.00 to 9.50
Machine Shop Turnings	11.50 to 12.00
Railroad Malleable	16.00 to 16.50
Agricultural Malleable	15.50 to 16.00
Stove Plate and Light Cast Scrap	15.50 to 16.00
Old Iron Splice Bars	19.50 to 20.00

CINCINNATI.

Pig Iron Market Quiet and Prices Show Little Change.

March 25.

Pig Iron.—The market has developed but little change during the week. Trade has been quiet and the volume of business placed through Cincinnati agencies has been rather small. There is developing in some quarters an unsettled feeling brought about by the dullness which has prevailed for the past few weeks, and offerings are more free of investment iron and at prices which are slightly below the understood basis of value. Spot iron is obtainable now at about $22.00 Birmingham, but it is being sold on an analysis basis, so that we can not revise spot quotations on strict grades to a lower level. We quote spot iron as a basis for settling contracts based on our quotations as follows, delivered at Cincinnati:

Southern foundry No. 1	$26.50
Southern foundry No. 2	26.00
Southern foundry No. 3	25.00
Southern foundry No. 4	23.50
Southern foundry, No. 1 soft	26.50
Southern foundry, No. 2 soft	26.00
Gray forge	$21.50 to 22.00
Northern foundry No. 1	26.65 to 27.75
Northern foundry No. 2	26.15 to 27.15
Northern foundry No. 3	25.65 to 26.65
Jackson County silvery, 8 per cent	31.15

For second quarter there is not much call for southern iron and $21.00 Birmingham can be done for No. 2, although the ruling asking price is $21.50. Northern iron is scarce and quoted at $23.00 at furnace.

For the last half of the year there is a firmer tendency to be noted. Several southern producers have advanced their prices to a basis of $19.00 Birmingham, claiming this course is justified by the

condition of their order books. While this is true, there is still plenty of last half iron offered at $18.50 Birmingham. Northern iron for this delivery is firm at $21 to $21.50 at furnace.

Deliveries are better and this has a tendency to make spot iron in less urgent request. Buyers are inclined for the most part to defer placing forward business and express the belief that nothing will be lost by waiting. We quote last half delivery delivered Cincinnati, as follows:

Southern Foundry No. 1	$22.00 to 22.50
Southern Foundry No. 2	21.50 to 22.00
Southern Foundry No. 3	21.00 to 21.50
Southern Foundry No. 4	20.50 to 21.00
Southern Foundry No. 1, soft	22.00 to 22.50
Southern Foundry No. 2, soft	21.50 to 22.00
Gray Forge	19.50 to 20.50
Northern Foundry No. 1	22.65 to 23.15
Northern Foundry No. 2	22.15 to 22.65
Northern Foundry No. 3	21.65 to 22.15
Jackson County Silvery, 8 per cent	30.15 to 31.15

Finished Material.—There continues to be a good jobbing demand and prices are well maintained. Specifications on contracts are good. There is not much being done in placing orders for future wants. Retail orders are filled in this market at the following prices:

Angles 3 x 3 and over, 2.15c to 2.25c; beams and channels 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2.10c; 3-16 inch, 2.20c; No. 8, 2.20c; sheets (blue annealed) No. 10, 2.30c; No. 12, 2.35c; No. 14, 2.40c; No. 16, 2.50c; box annealed sheets, Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c; and No. 28, 2.95c. Iron and steel bars, 2.00c base; boiler tubes, 60 per cent off base; turn buckles, 45 per cent off; rivets, 3.15c base; cold rolled shafting, 45 per cent off list; steel tire, 2.10c base.

Coke.—The market rules easy and offerings are more free. There is nothing being done in the way of contracts at this time. Quotations in the leading coke producing districts are as follows:

Wise County, Va., Furnace Coke, prompt shipment	$3.00 to 3.25 per ton
Wise County, Va., Foundry Coke	3.75 to 4.00 per ton
Pocahontas Furnace Coke, prompt shipment	3.00 to 3.25 per ton
Pocahontas Foundry Coke	3.50 to 4.00 per ton
Connellsville Furnace Coke, prompt shipment	3.00 to 3.50 per ton
Connellsville Foundry Coke	3.75 to 4.00 per ton
New River Foundry Coke on contracts	3.75 to 4.00 per ton
New River Furnace Coke, prompt shipment	2.75 to 3.00 per ton

*Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.70 to $1.75 per ton on $9.00 pig iron, plus 19 to 20 per cent of the advance on pig iron above $9.00 Birmingham.

Old Material.—There is a strong tone to the market and quotations for some grades are higher. We quote f. o. b. Cincinnati, as follows:

Old No. 1 railroad wrought, net tons	$17.50 to 18.50
Cast machine and foundry, net tons	19.00 to 19.50
Old iron rails, gross tons	25.50 to 26.50
Old steel rails, gross tons	19.00 to 20.00
Old short lengths, gross tons	19.00 to 20.00
Old iron axles, net tons	26.00 to 26.50
Heavy melting scrap, gross tons	20.00 to 21.00
Stove plate, net tons	15.50 to 16.00
Wrought turnings, net tons	13.50 to 14.00
Cast borings, net tons	11.00 to 11.50
Car wheels, gross tons	23.50 to 24.00

CLEVELAND.

Pig Iron Strong.—Premiums on Plates.—Scrap Prices Firm.

Office of THE IRON TRADE REVIEW.
Browning Building, Mar. 26

Iron Ore.—The movement of ore from docks to furnace is heavy. Indications are that vessel interests will be very cautious about starting their boats this spring, as the disasters of last season at the opening of navigation are fresh in memory, and owing to the strike now on at the ship yards, it would be difficult to have repairs made. Some contracts for wild tonnage have been made within a few days.

Pig Iron.—The market is very strong, and while buying has not been brisk, there is more inquiry for last half delivery, on which the quotation for well known brands is $22, valley furnace, although there have been some transactions at 50 cents less. The demand for spot foundry iron is active and the supply of standard grades very limited. Some spot has sold as high as $26, Cleveland, but a little is to be had at $25. There is more inquiry for spot basic, on which the quotation is from $22.50 to $23. The southern situation seems to be stronger, and there is very little iron to be had for last half delivery at less than $18.50. The Cleveland Furnace Co. will blow out its stack this week for relining. We quote f. o. b. Cleveland for last half delivery as follows:

Bessemer	$21.00 to 21.50
No. 1 Foundry	22.50
No. 2 Foundry	22.00
No. 3 Foundry	21.50
No. 2 Southern	22.60
Gray Forge	20.00 to 20.50

Coke.—The coke market shows little change. Although the production was much curtailed by the recent flood, the demand decreased sharply on account of a large number of furnaces being banked. For the remainder of the year we quote furnace coke $2.90 to $3 at the ovens, and foundry at $3.50 to $3.60.

Finished Material.—The plate situation is one of the strongest features of the local market, and in some cases more than two cents has been paid for tank steel at the mill. Inquiry for plates for the last half of the year has increased, one for 2,500 tons having come out this week. There is some inquiry for light rails, and the demand for shapes continues to show improvement. Neither manufacturers nor jobbers see any indications of curtailment in railway purchases. Steel bars are very strong, and offers of premiums for prompt delivery have been refused by some mills. Independent manufacturers of pipe have advanced their quotations one point.

Old Material.—The scarcity of cast scrap has brought many dealers into the market to fill their requirements for present contracts and this is tending to keep quotations firm. Dealers are showing an unwillingness to take cast scrap contracts unless they have a supply in stock, so great is the dearth of this material. Steel scrap is nominal, but stove plate, car wheels, cast scrap, turnings and borings are in strong demand. The local market is dull and eastern mills are taking all the desirable grades that can be obtained from Cleveland brokers. The Lake Shore railroad is asking bids on a list of over 3,000 tons. We quote, unchanged, f. o. b. Cleveland, gross tons, as follows:

Old iron rails	$25.00 to 26.00
Old steel rails (re-rolling)	18.50 to 19.50
Old steel rails (under 6 feet)	18.50 to 19.50
Old car wheels	23.00 to 23.50
Steel boiler plate	13.50 to 14.00
Steel axles	21.50 to 22.50
Malleable iron (railroad)	18.50 to 19.00
Malleable iron (agricultural)	16.00 to 16.50
Heavy steel	17.00 to 17.50
Country mixed steel	14.50 to 15.50
Low phosphorus	23.00 to 24.00

We quote net tons as follows:

No. 1 R. R. wrought	$17.00 to 18.00
No. 1 busheling	14.50 to 15.00
No. 1 machine cast	18.50 to 19.00
Iron axles	25.50 to 26.00
Axle turnings	13.50 to 14.00
Wrought turnings (free from cast)	13.00 to 13.50
Grate bars	14.00 to 15.00
Pipes and flues	13.50 to 14.00
Tank iron	12.00 to 13.00
Hoop and band iron	8.50 to 9.00
Sheet iron	7.50 to 8.50
Wrought drillings	13.00 to 13.50
Stove plate	15.00 to 15.50
Cast borings	10.50 to 11.00

PHILADELPHIA.

Many Inquiries for the Last Half.—Slight Lull in Finished Material.

March 25.

Pig Iron.—A renewal of inquiries as to prices for the last half of the year is the most interesting development of the past week. While it cannot be learned that any very large orders have been placed, the fact that consumers are beginning to look beyond the second quarter is regarded as a significant indication that they expect little concession from prevailing figures, especially during the third quarter. There is a very active demand for second quarter iron, but there are few furnaces in this territory that are able to take on any more business, and prices are held stiffly at about $25 to $25.50 for No. 2X foundry, $23.25 to $23.75 for standard gray forge, and $24.50 to $25.00 for basic. Acute distress among many small consumers is

only averted by the purchase of English iron, which still continues to arrive in considerable quantities, with a fairly large amount bought for April delivery. Middlesbrough No. 3 in dock brings $22. It would be idle to deny that Wall street's protracted troubles are not having an effect on business sentiment, but no concrete instance is known where they have had as yet led to any direct cancellation of orders, outside of the cessation of work on certain projected improvements by railroads in New York state. Prices for the last half, which necessarily exhibit a wide range, and apply principally to the third quarter, may be quoted as follows:

No. 1X Foundry	$25.50 to 26.00
No. 2X Foundry	23.75 to 24.75
No. 2 Plain	23.25 to 23.75
Standard Gray Forge	22.50 to 23.00
Basic	23.75 to 24.50
Low Phosphorus	27.00 to 27.50

New Material.—A slight lull in buying activity is reported, possibly because of the existing disturbed financial situation, but the mills have so much business booked ahead that this, of course, in no way affects their present operation. From present indications, if one may judge from local conditions in Philadelphia, any falling off in the demands by railroads for structural material will be made up by demands for such products for building construction, of which a remarkable amount is in sight. Prices show no change, and may be quoted as follows:

Beams, channels and angles, according to specifications, 1.83½c to 2c; refined iron bars, 1.89½c to 1.93½c; steel bars, 1.83½c to 1.88½c; plates, 2.13½c to 2.18½c.

Old Material:—The market remains in the same quiet condtion as for some weeks past, with no important price changes. The advent of spring brings with it the usual collections by small dealers in country districts, and the sale of this scrap is expected to keep prices at about their present level for a time, with little chance of advancing. Prices are substantially unchanged as follows:

Old steel rails	$19.50 to 20.00
No. 1 steel scrap	18.75 to 19.25
Old steel axles	22.00 to 22.50
Old iron axles	29.00 to 30.00
Old iron rails	27.00 to 27.50
Old car wheels	23.00 to 24.00
Choice scrap, R. R. No. 1 wrought	20.75 to 21.25
No. 1 yard scrap	18.75 to 19.25
Machinery scrap	22.50 to 23.00
Low phosphorus scrap	22.50 to 23.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	17.00 to 17.50
No. 2 forge fire scrap, ordinary	11.50 to 12.00
Wrought turnings	16.75 to 17.25
Axle turnings, heavy	17.25 to 17.75
Cast borings	16.00 to 16.50
Stove plates	17.00 to 17.50

J. H. Porter, formerly connected with the Buffalo Steel Co., Tonawanda, N. Y., has resigned his position.

NEW YORK.

Pig Iron Market in Good Condition.—Many Building Projects Pending.

Office of THE IRON TRADE REVIEW, Room 1315, No. 150 Nassau St., Mar. 26

Pig Iron.—Some important tonnages have figured in the business of the past few days. The Singer Sewing Machine Co. has closed for 6,000 tons for second and third quarter delivery, the order going to Virginia and eastern furnaces at the full market price. The General Electric Co. is reported to have placed the full amount of its inquiry for the Schenectady plant, but at last reports had not contracted for that needed at the Lynn works, some 4,500 tons divided between foundry and low phosphorus iron. In addition, several lots of 1,000 tons and smaller have been placed, and inquiries are holding up remarkably well, considering the unsettled condition of the stock markets and the consequent tendency toward hesitancy. Much of the business recently placed has been practically non-competitive; that is, the fact that the consumer was in the market was made known to only a few select sellers and the question of delivery played a considerable part in determining where the business went. During the past fortnight, several furnaces have announced that they can take no further orders for delivery prior to the fourth quarter, and a local selling concern serving more than a half dozen furnaces states that it has only a handful of iron available before that date. There has been some selling of southern irons into this district during the week on the basis of $18.50, but this is the lowest figure procurable and not a few producers are holding firmly at $19.00. Coke continues easy, with sales for nearby shipment at $3.75 to $4.00. For second half delivery we quote tidewater pig iron prices as follows:

Northern Foundry No. 1	$24.00 to 25.00
No. 2 Foundry	23.50 to 24.50
No. 2 Plain	23.00 to 24.00
No. 1 Southern Foundry	22.50 to 23.00
No. 2 Southern Foundry	22.00 to 23.00
No. 3 Southern Foundry	21.50 to 22.00
No. 4 Southern Foundry	21.00 to 22.00

Finished Material.—In the local market few building operations have been let during the week and railroad work has been extremely small, so far as actual contracting is concerned. This does not mean, however, that there is any decrease in the volume of prospective business, and the early future is certain to see the award of important tonnages. Apparently, the demand is stronger in the west, as it is stated that projects involving at least 50,000 tons of structurals are now ready for the letting. The feeling of hesitancy which has prevailed for some time, however, has had the effect of making the smaller fabricating and erecting shops exceedingly eager for business and many jobs involving a limited tonnage have been taken at prices which promise difficulties for the successful bidders. The Central Railway of New Jersey has placed orders with the McClintic-Marshall Construction Co. for 1,100 tons of bridge materials. The Boston Bridge Co. has taken 800 tons of structurals for the Brown building in that city and 1,500 tons for the Denver auditorium has been placed with an Indianapolis concern. The drill hall at Fort Leavenworth, requiring 350 tons, has been let to the Missouri Valley works and an outside interest has taken 1,000 tons for a factory building in Chicago. In addition to the steel for the Frankel building in New York, about 2,060 tons, the American Bridge has taken 1,800 tons for a building in San Francisco and 600 tons for the Carnegie Steel Co. for the erection of a finishing mill, besides several smaller lots.

In other finished lines no great activity is manifested, though specifications are extremely heavy and frequently attempt to exceed contracts. New business in cast iron pipe is at a standstill, and there is little demand for plates, though in both lines prospective business is encouraging.

The following are prices at tidewater:

Angles 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.94½c; marine boiler, 2.24½c; refined iron bars, 1.89½c; soft steel bars, 1.74½c; sheets, No. 28, black, 2.60c.

Old Material.—The situation continues active, with melting heavy and yards practically bare. Cast borings, machine cast, wrought turnings, stove plate and grate bars in brisk demand. Railroad malleable is weak. We quote New York prices, gross tons, as follows, freight to delivery point being on an average $1.80 additional.

Old iron rails	$24.00 to 25.00
Old steel rails, long lengths	19.00 to 19.50
Old steel rails, short pieces	16.50 to 17.00
Relaying rails	28.00 to 29.00
Old car wheels	22.00 to 23.00
Old iron car axles	28.50 to 29.50
Old steel car axles	21.00 to 21.50
Heavy melting steel scrap	17.00 to 17.50
No. 1 railroad wrought scrap	20.50 to 21.00
Iron track scrap	17.50 to 18.00
Wrought pipe	14.50 to 15.00
Cast borings	12.50 to 13.00
Wrought turnings	14.75 to 15.25
Heavy cast scrap	19.50 to 20.00
Railroad malleable	19.50 to 20.50
Agricultural malleable	14.50 to 15.00
Stove plate	16.00 to 16.50
Grate bars	14.75 to 15.25

BUFFALO.

Inquiries for Pig Iron Numerous and Buying Increases.

March 26.

Pig Iron.—An increase in buying has been observed the past week, but it has not become general. It is thought the market will grow more active gradu-

ally until it gets back into a normal condition. Most of the buying is for third quarter and last half delivery. Inquiries are numerous, showing an aroused interest among the consumers. The Buffalo furnaces are all working now at full capacity. One of the furnaces of the Buffalo & Susquehanna Iron Co., which was blown out for relining some weeks ago, has been blown in and now is working very satisfactorily.

Fewer complaints than usual are heard relative to shipping out irons, as freight is moving more freely. During the latter part of last week, however, considerable annoyance was caused to consumers whose deliveries had been delayed enroute.

Some foreign iron continues to find a market in the Buffalo district, several good-sized shipments coming in each week. English iron is the only foreign pig finding its way here at present. The sale of Scotch in this market is not perceptible. Very little of this grade ever comes here.

No change in quotations is noted here this week, and the market is holding steady with the usual firm prices. For last half delivery we quote as follows:

No. 1X Foundry	$22.75 to 23.25
No. 2X Foundry	22.25 to 22.75
No. 3 Foundry	21.50 to 22.00
No. 2 Plain	22.00 to 22.50
Malleable Bessemer	22.50 to 23.00
Gray Forge	21.50 to 22.00
Charcoal	26.00 to 27.00

BIRMINGHAM, ALA.

Decreased Production of Pig Iron.—Several Accidents.

March 25.

A remarkable impetus to the demand for spot iron and also for future iron was noted during the latter part of the past week and it was accounted for in the fact that Pennsylvania furnaces were down and out because of floods. The Birmingham district was not in position to handle much, if any, of the business offered for spot iron. What little spot iron there was to obtain went to regular patrons of the district and as far as could be learned very little business offered by reason of the trouble in Pennsylvania was booked in this district. The production in Alabama is off somewhat. One of the furnaces of the Alabama Consolidated Coal & Iron Co. met with a little accident recently, necessitating immediate repairs during which the furnace will be out of blast. The Woodward Iron Co. lost a furnace by a slip in the lining two weeks ago and during the past week a crew of men making repairs lost their lives, six told, by the lining falling in on them while they were inside the furnace taking out the fire brick. The Tennessee Coal, Iron & Railroad Co. has three furnaces at Bessemer under repairs and two of them will not be ready for the torch in several weeks. The Sloss-Sheffield Steel & Iron Co. will not be able to get the Philadelphia furnace ready for blast within five weeks at the earliest. It was expected that the iron maker would be ready the end of the present week. Other furnaces are out in this district with some of the furnaces which have been in blast for a number of months showing signs of needing repairing.

The demand has been remarkably good for some time and there is an intimation that fourth quarter iron will command fifty cents above present quotations in the near future. The probable make for the first three quarters of the year has been nicely covered and there are many sales already booked for iron after October with a most healthy inquiry being received.

Very little improvement is noted in the railroad car situation, as far as shipping the manufactured article from the district is concerned. In the district, there is some improvement and as a consequence the coal output is on the increase. However, the manufacturers of pig iron report but little, if any, change in the transportation facilities. Some apprehension is already expressed that to advance the freight rates on April 3 would be felt, though there are conflicting statements as to the amount of iron and cast iron pipe on the yards delayed because of the car shortage. One furnace company at least has announced that its shipments are now up to the first of the year, that is all shipments which were promised during the month of December have been filled, which makes the business still two months and a half behind. The general sales agent of this company states that it would be just as wrong to advance the rates on the business still remaining as it would have been to advance the rates two months and a half ago inasmuch as the delay in the transportation had effect on earnings and caused a general delay in the business.

The Southern Stove Makers' Association held a meeting in Birmingham last week and general conditions were discussed. The high price of pig iron, the scarcity of labor and other matters pertaining to the industry were gone over. While no statement is made, an advance of five per cent is noted in stoves. Positively no information was given out in regard to the reported combination of stove makers in the south with headquarters in Atlanta.

The furnace of the Struthers Furnace Co., at Struthers, O., which has been undergoing repairs, has been blown in. The report that No. 2 furnace would be built is incorrect.

ST. LOUIS.

Pig Iron Market Quiet and Spot Quotations are Higher.

March 25.

Pig Iron.—Although the market is quiet, an undertone of firmness is plainly discernible for all deliveries. The suspension of so many eastern furnaces and heavy northern buying have had the effect of hardening prices materially, but still buyers in this territory are holding off pending developments.

Buyers are purchasing chiefly for immediate consumption, causing a hand to mouth market which makes spot more at a premium than it was last week. As high as $24 is paid for southern No. 2 on track or in transit whereas $23 has been the quotation for weeks with the exception of a short period when it could be bought for $22.50. Last half is still strongly maintained at $18.50, with some small sales reported at $18.75. There seems to be little interest in second quarter. Most of the melters have iron under contract which is long overdue and they are trusting that this iron will be delivered within the next two or three months. In the meantime they are buying only such supplies as are necessary to run their plants.

Our quotations for last half, including the freight rate of $3.75 from Birmingham to East St. Louis, range as follows:

Southern No. 1	$22.25 to 22.75
Southern No. 2	21.75 to 22.25
Southern No. 3	21.25 to 21.75
Southern No. 4	20.75 to 21.25
Gray Forge	19.75 to 20.25

Coke.—Coke is quiet and prices are somewhat lower. Connellsville furnace is selling at $3.70 and foundry is selling from $3.90 to $4.25. An inquiry for 12,000 tons is pending.

Finished Material.—The contract for the steel for the American Theater and Hotel, 2,000 tons, has been let to the Noelke-Richards Steel Co. Specifications for the steel in the First National bank building of Paducah, Ky., requiring 900 tons, have just been given out.

BRITISH IRON MARKET

Although Unsettled, Consumers Resume Buying Iron.

Office of THE IRON TRADE REVIEW.
Prince's Chambers, Corporation St.
Birmingham, Eng., Mar. 15

The pig iron market continues in an unsettled state, with a weakening tendency. On Thursday last, there was a much more hopeful feeling on the Birmingham Exchange, with a disposition to resume pig iron buying. Greater firmness was also apparent both at Glasgow

and Cleveland, iron from the latter district realizing £2 15s 4d ($13.54), cash, with a sale of 17,000 tons. By Tuesday, weaker reports from America reduced prices for Cleveland to £2 14s, cash, ($13.22), a lower figure than has prevailed since August. Only 15,000 tons were dealt with. The stores continue to reduce by about 1,000 tons per day, yesterday's total stock being 486,379 tons. There has been a slight fall in Cumberland hematite iron. The dominance of American influence is still a noticeable feature in determining prices, and the fact that big shipments on old orders have still to take place does not counteract the effect of the present depressing reports. It is remarkable that the Birmingham market is very far from being in sympathy with the north, and some pig iron transactions have actually taken place within the last few days at an increase of 9 pence upon the figures of the week previously. The pressure is so great for iron that some buyers have threatened to complete their supplies from other furnaces than those with which they have contracts, and to charge the difference to those who have failed to fulfil their contracts. Unless prices fall considerably it seems likely that many new contracts will be made shortly. A fall in pig iron could be a great boon to finished iron makers, whose profits are nearly extinguished by the high price of pig, associated with dear fuel.

The opening of the shipping season has brought a remarkable amount of business from the colonies. Australia is sending very substantial orders for pig iron, malleable iron, steel bars, wire netting, and fencing, steel thin plates and sheets, galvanized material, machinery of various descriptions, and structural steel and iron sections. Some very big orders have been received, also, from Canada, which run into hundreds of thousands of tons. A large proportion of these orders have gone to the west of Scotland, which has the advantage of special shipping facilities with the dominion. British makers are hoping for large orders in connection with the railway and industrial developments projected in Canada. Better orders are coming from the various South African colonies.

Finished iron prices have given away a little in sympathy with pig iron, although the works continue well employed. The most significant example is galvanized sheets, in which selling prices have once more fallen to the standard. This standard is £13 15s per ton, but for several months past, actual sales have been from £5 7s 6d over whatever standard minimum happened to exist. This indicates a slight falling off in strength, but manufacturers are not sorry to see prices easing a little, as they were becoming so high as to imperil the continuance of good trade. There is a little weakness in strip, and in this line makers will be very glad if they can lift up steel prices a little, the profit margin having almost disappeared through the high cost of raw materials.

The latest Board of Trade returns show some remarkable figures. The iron and steel exports show an increase of half a million, as compared with a year ago, and of over a million and a quarter as compared with February, 1905, while, on the other hand, the value of the imports has decreased by £23,958. The imports totalled only 61,670 tons, compared with 118,733 tons a year ago, which is a decrease of rather over 48 per cent. It is evident the home market is being left to British manufacturers to a greater extent than for many years past.

METAL MARKET.

CHICAGO.

March 25.

Little activity has been apparent in the metal market during the past week. Prices have continued steady and the volume of business normal. The only drop in prices apparent was a decrease in the price of pig tin, which fell below the price of last week.

Copper sold at 26¾c for casting and 27c for lake. Pig tin sold between 44¾c and 44½c dependent on the quantity bought. Sheet zinc sold at 8.50c La Salle in car lots of 600-pound casks. Spelter was quoted at 6.90c. Lead desilverized was quoted between 6.50c and 6.60c for 50-ton lots and corroding at 7.25c to 7.35c. Carload lots sold 2½c per 100 pounds higher. For Cookson's antimony 28½c was asked; other grades sold for 26½c.

The price of nearly all old metals dropped. The drop in copper on the London market was given by the dealers as the cause for the decline. Prices quoted by buyers were: Copper wire, 20c; copper bottoms, 20c; copper clips, 19c; red brass, 19c; yellow brass, heavy, 15½c; yellow brass, borings, 14¾c; red brass borings, 17c; light brass, 12½c; pipe lead, 5.25c; tea lead, 4¾c; zinc, 5c; tin foil, 32c; pewter No. 1, 26c.

NEW YORK.

March 26.

Copper.—The local market reflected in some slight degree the sharp break of Monday on the London market. Electrolytic was marked down to 24¾c to 25¼c, which, while 1¼c above the opening price of the year, is more than 7c above that of a year ago and 10c above that of two years ago. Lake is quoted at 25 to 25½c and casting at 24¼c to 24½c. Easier conditions are expected to prevail. The coming of spring means that cars will be moved with greater dispatch and it is pointed out as significant that so far this year British consumption has fallen off more than 1,500 tons as compared with the same period of 1906. Best selected closed yesterday on the London market at £115, and standard spot at £101 10s, a decline of more than £5 during the week.

Pig Tin.—Conditions here closely resemble those of the copper market. The situation is erratic and weak under pressure to sell, following a sudden decline abroad. Spot is procurable at 39½c to 40c, with futures ranging from 39c to 39¾c. Spot London closed yesterday at £182 with futures at £180 5s. March arrivals aggregate 3,780 tons, with 2,740 tons afloat.

Pig Lead.—The market is without feature. Spot is quoted at 6.25c to 6.35c. Soft Missouri is offered spot at 6.05c and soft Spanish closed yesterday on the London market at £19 16s 3d.

Spelter.—Refined is easier, the quotation for carload lots being 6.85, with demand only moderate. The London close yesterday was £26 5s, a slight decline during the week.

Antimony.—The market is dull and easy with quotations as follows. Cookson's 24½c to 25c; Hallett's 23c to 23½c, and ordinary brands 22c to 22½c.

ST. LOUIS.

Lead is quoted at 6.075c for Missouri brands. Non-corroding brands are bringing 6.10c. Spelter is steady at 6.75c.

Daft & Heyward, Brokers.—The new brokerage firm of Daft & Heyward, with offices in the Frick Building Annex, Pittsburg, will be ready for business April 1. Both members of this firm are well known in iron and steel business, Thos. R. Heyward having been connected as salesman with Naylor & Co.'s Pittsburg office, and Andrew C. Daft with Reed F. Blair and Hickman, Williams & Co. They will handle a full line and have furnace connections as well as affiliations with coke operators and importers of alloys.

Plants Destroyed.—Fire in the Penn avenue manufacturing district, Pittsburg, March 23, destroyed the plants of Baird & Co., the Simonds Mfg. Co., the warehouse of Brown & Zortman and the Reinforced Brazing & Machine Co., the entire loss being estimated at $150,000. The four manufacturing plants were under one roof and the fire was started by a gasoline explosion. The losses will not seriously handicap any of the firms.

NEW MILLS

Will be Built by American Steel & Wire Co. at Cleveland.

The United States Steel Corporation has authorized the American Steel & Wire Co. to construct in Cleveland a hot mill for rolling thin flats and a wire mill for drawing wire for the manufacturing trade. The plant will also produce bale ties for the market. Inasmuch as real estate in the city of Cleveland is held at very high figures, it was thought best to secure property along the line of the Newburg & South Shore railway, on which the mills will be erected. It is not known definitely the exact tonnage of output, but it is most likely that upwards of 1,000 men will be employed. The location from a freight distribution standpoint is a good one, inasmuch as the Newburg & South Shore railway—which partakes of the nature of a belt-line—connects with most of the trunk lines. The drawings are being completed rapidly and it is expected that work will commence within a few weeks. The plants will contain the most up-to-date machinery, all driven by electric power generated by units driven by gas engines.

It is officially stated at the offices of the United States Steel Corporation that no decision has as yet been reached in regard to the establishment of blast furnaces and a steel plant in the vicinity of Duluth, Minn. The project was discussed at a recent meeting of directors and a committee appointed to inquire into its feasibility and wisdom. Several members of this committee have visited the Duluth district, but the matter is still in abeyance, despite numerous newspaper reports that a decision to erect the plant has been reached.

NO CANCELLATIONS

Received by Steel Corporation—Sales Exceed Those of Last March.

(Special Telegram.)

New York, March 27.—Relative to reports of railway curtailments, Judge Gary says: "We have not had any cancellations of orders for rails or other products. Business of all forms is much larger in volume than in the corresponding period last year. So far this month, we have entered in new business 10,000 tons a day of finished products in excess of the tonnages sold in 25 days of March last year."

Plant is Operating.—The New York State Steel Co., of Buffalo, began operations Wednesday, March 27, by turning on the gas in the Talbot open-hearth furnaces. The plant is now running in fine shape and employs between 300 and 500 men.

IMPORTANT CONFERENCE

Of Stove Founders and Molders Being Held at Chicago.

(Special Telegram.)

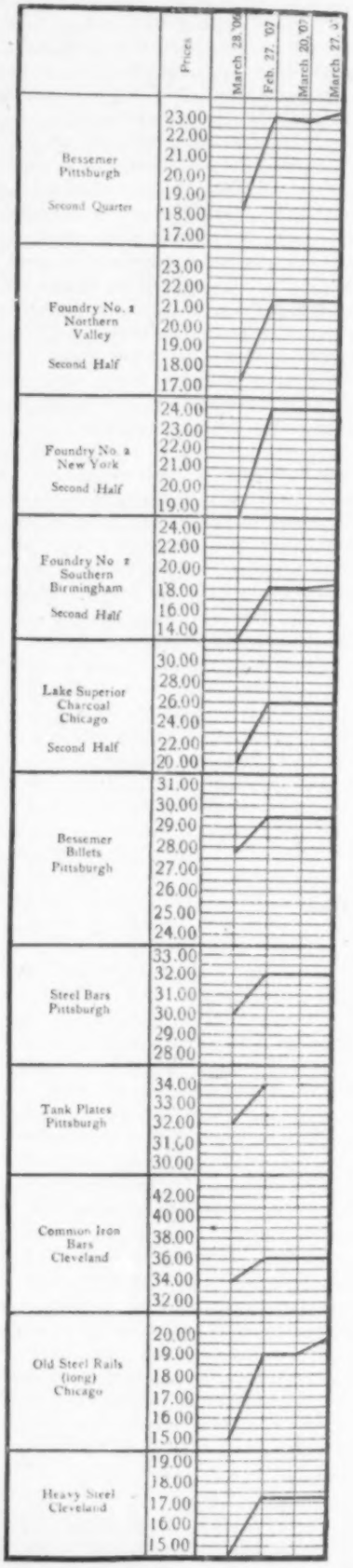
Chicago, March 27.—The conference committee of the National Stove Defense Association is in annual session at the Auditorium Hotel, this city. A 10 per cent advance and the readjustment of several disputed shop conditions have been demanded by the Iron Molders' Union, and these are being considered, together with several demands made by the manufacturers. The stove manufacturers are represented by the following persons: D. McAfee, president of the association; Thomas Hogan, secretary; E. W. Peck, Cooperative Foundry Co., Rochester, N. Y.; A. C. Mott, Abraham Cox Stove Co., Philadelphia, Pa.; L. Crowley, Detroit Stove Works, Detroit, Mich.; S. R. Baldwin, Pittsburg Stove and Range Co., Pittsburg, Pa.; and William H. Cribben, Cribben & Sexton Co., Chicago.

The iron molders' union is represented as follows: Joseph F. Valentine, president; M. J. Keough, first vice president, Troy, N. Y.; Joseph Rohlman, Columbia, Pa.; Jesse Heacock, Quincy, Ill.; C. T. Nevius, Taunton, Mass.; Thomas Kenny, Detroit. The second and third vice presidents and the editor of the *Iron Molders' Journal* are also present as visitors.

New Sheet Mills.—The American Sheet & Tin Plate Co. announces that its eight new sheet mills at the Vandergrift plant will be ready for operation about April 15, giving this plant a total of 37 mills. At the Scottdale plant, ten new galvanized pots are being installed and will be ready about July 1, and the increase of output will be from 300 to 350 tons of galvanized sheets per day.

Will Build Additions.—The Halcomb Steel Co., Syracuse, N. Y., on account of the very gratifying results it is obtaining from its tool steel, has been obliged to still further add to its plant and increase its facilities for output. It has decided to make the following improvements during the next few months: Additional gas producers for its open-hearth department, also a 50-ton electric traveling crane for same, an extension of the hammer shop building to enable it to install two more large steam hammers, with necessary heating furnaces, a locomotive crane and additional machinery for the cold rolling and cold drawing department.

PRICE CHART.


Prices
March 28 '06
Feb. 27, '07
March 20, '07
March 27, '0
Bessemer Pittsburgh Second Quarter
23.00 22.00 21.00 20.00 19.00 18.00 17.00
Foundry No. 2 Northern Valley Second Half
23.00 22.00 21.00 20.00 19.00 18.00 17.00
Foundry No. 2 New York Second Half
24.00 23.00 22.00 21.00 20.00 19.00
Foundry No. 2 Southern Birmingham Second Half
24.00 22.00 20.00 18.00 16.00 14.00
Lake Superior Charcoal Chicago Second Half
30.00 28.00 26.00 24.00 22.00 20.00
Bessemer Billets Pittsburgh
31.00 30.00 29.00 28.00 27.00 26.00 25.00 24.00
Steel Bars Pittsburgh
33.00 32.00 31.00 30.00 29.00 28.00
Tank Plates Pittsburgh
34.00 33.00 32.00 31.00 30.00
Common Iron Bars Cleveland
42.00 40.00 38.00 36.00 34.00 32.00
Old Steel Rails (long) Chicago
20.00 19.00 18.00 17.00 16.00 15.00
Heavy Steel Cleveland
19.00 18.00 17.00 16.00 15.00

INDUSTRIAL CONDITIONS

Discussed by Judge Gary.—Public Sentiment a Most Important Factor.

In an important interview in the *New York World* during the past week, Judge Elbert H. Gary, chairman of the board of directors and finance committee of the United States Steel Corporation, presents his views of the business future and declares that the honest operation of railroads and the great corporations will put an end to the hostility of the public.

"Referring first to our own business," said Judge Gary, "present conditions are better today than a year ago, both with respect to orders on hand and new orders received. We are booking at least 10,000 tons a day more than one year ago.

"Whether or not conditions will continue to be good depends upon many things. Capital is timid, money is high and somewhat scarce, and the railroads declare they are not able to finance their enterprises. This probably will result in some relaxation. We have been running at high tension.

"But the absolute necessities of the railroads to handle and accommodate their business will compel them to buy a large proportion, at least, of the tonnages they have been buying in the past. Therefore, with the other business, which is good, there is nothing now in sight to indicate that we will not have a good volume of business through the year.

"I am not a prophet. I do not wish to predict whether times are going to be good or panics are to come a year hence, because one never can tell what may happen in the meantime. The unexpected involving of the country in outside difficulties or internal political disturbances might easily upset all calculations.

Not a Time for Pessimism.

"So far as the money question is concerned, it is more or less an automatic matter. If the volume of money is not enough on which to do business, then business will have to be curtailed to meet the money situation. If we are going too fast, a little diminution will not hurt us any. This is no time for hysteria or pessimism. We should keep our heads."

Judge Gary's attention was called to the pronounced public hostility against many great corporations, in frequent instances leading to the demand for federal control, and was asked his solution of the problem. He replied:

"My solution is this: A disposition on the part of men who occupy positions of responsibility and influence to improve their methods and to get into condition where they will be above reproach and attack. If the men who are complaining of movements calculated to bring exposure and rectify wrongs will themselves become investigators and reformers, they need fear no attack from others. Of course, I have no particular corporation or individual in mind.

"The great rectifier of wrongs in this country is public sentiment. It cannot be ignored. Public sentiment is our greatest power. When men come to the conclusion that it pays in dollars and cents to be honest then we shall have good corporation conditions. Being good after you have been driven to it does not breed much public confidence.

Stability of Prices.

"We believe," continued Judge Gary, "that it is best for our interests and best for the prosperity of the country to keep prices stable, neither too high nor too low. If prices go too high it is a bad condition for the nation. There is the danger of reaching so high a point that they will topple over with a crash.

"We are paying higher wages than ever. The cost of living to our men has increased. Nearly all articles that enter into our daily life have risen in cost, yet the prices of our steel products are on a lower level than those of a great many other commodities. This has been done by increase in output and lower cost of production, even though labor is high. Improved organization, improved equipment, larger output owing to the constant employment of the mills to their capacity, new devices and better methods are the factors that permit of this keeping of prices down to a low, steady level.

"Another factor entering into this is our foreign business. Export shipments of the United States Steel Corporation last year showed an increase of 13 per cent in tonnage and 28 per cent in gross receipts over the figures of 1905. The aim has been to build up a permanent and continuous export trade with a view to providing markets which at all times may be relied upon to absorb a fair proportion of the total production rather than to sell material in foreign countries only at times when the domestic market is unable to take the entire output of the mills.

Prices Abroad.

"The foreign market conditions are strong, and we have been able to obtain better prices there. In many important lines the prices realized abroad equaled those of the domestic market. For example, we sold to one foreign government 50,000 tons of rails at a little in excess of 50 cents per ton more than the home price. This is not an exceptional case, for there were numerous other sales at partly or a little above. The effect of this rise in foreign prices is to enable us to maintain lower prices at home.

"These conditions must not be considered as militating against the proposition that at times it is better for the manufacturer, for the benefit of his employes and for the domestic purchaser, to sell goods abroad at a lower price than at home.

"It is the policy of manufacturers to keep the mills, furnaces and transportation companies in operation to their full capacity whenever practicable. Obviously, this is wise. It results in lower cost of production, and therefore influences lower prices generally to the domestic purchaser; and it secures continuous employment to the wage earner.

"The higher prices we have been able to obtain abroad during the past year, and the better control we have been able to obtain over foreign fields are working to the advantage of the home consumer. These foreign conditions contribute to the maintenance of our present steady level of prices in the midst of increases in the prices of so many other commodities.

"Except for our enormous capitalization, we could not maintain our expensive organization or afford the perfected equipment that enables us to realize from foreign business what we now do."

PIG IRON FREIGHT ADVANCES.

The reported general advance in rates on pig iron from northern producing centers has been arranged for by the railroads and will take effect on June 1. From producing points east of the Mississippi river, except Chicago, the rates to points where the rate is now less than $1.50 will be advanced 5 cents per ton. To points where the rates are $1.50 per ton or more, the advance will be 10 cents per ton. There are some exceptions to this rule, but as a general proposition this is about what the new rates will result in establishing. This means that rates on pig iron from the Pittsburg district, from all Ohio furnaces, and from Detroit, will be subject to the advance in rates above outlined.

The advances from Chicago are under consideration, but are not yet given out in detail.

Will Foster Peace.—The coming year of the Toledo branch of the National Metal Trades Association will be devoted to the building up of the machine industries of Toledo, and an effort will be made to co operate with the employes to advance personal skill and to eliminate all misunderstandings. At the annual meeting held March 16, the old officers were re-elected as follows: President and treasurer, Alexander Backus; vice president, A. E. Shaaf; secretary, A. C. Fischer; executive committee, S. M. Foster, C. J. Hinde, C. E. Sutton, G. M. Acklin and C. F. Meilink.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades,

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BUFFALO .....932 Ellicott Sq.
CHICAGO ..... 1362 Monadnock Blk.
CINCINNATI ..... 124 Government Place.
NEW YORK ..... 150 Nassau St.
PITTSBURG ..... 521 Park Bldg.
DULUTH

Subscription, $3.00 per annum. To Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co., will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND, AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP

March 28, 1907.

PIG IRON STILL FLUCTUATES.

Since the great boom of 1899, with its lesson of the effects of very high prices, taught so roughly by the tumble in 1900, and the formation of the United States Steel Corporation in 1901, with its great steadying effect, the American iron trade has had a period of comparative steadiness in prices of finished steel products. The fluctuations from month to month have been of little moment, and there has indeed been but one movement of great consequence, which was the dip in prices, centered in the latter part of the third quarter of 1904.

Not so with pig iron. The fluctuations have, perhaps, been as extreme as they have been at any time in the history of the American iron trade. The greatest swing since 1901 has been the drop, from August, 1902, to December, 1903, which amounted to about $10 per ton, taking the average of all grades and all districts. The next most pronounced swing was the advance from the latter part of July last, to the end of December, during which five months prices for far future delivery advanced fully $5 a ton on an average, while prices for prompt iron advanced about $8 per ton. In July prices for prompt and future were about on a par; by the end of December a spread of from $2 to $3 a ton had been established, and that spread has been maintained pretty well to the present.

There is not a great deal in the earlier history of pig iron prices to put these performances in the shade. Going back to before the war we have a table of yearly averages of No. 1 anthracite foundry pig iron at Philadelphia. Between 1844 and 1861, the highest annual average was $36.88, in 1854, and the lowest $20.25 in 1861. The greatest swing was fom a low point of $20.88 in 1850, to the $36.88, in 1854 The greater part of the movement was from $22.63, in 1852, to $36.12, in 1853. Considering, however, the very small tonnage, and the high average price, this was not so great a performance. Fluctuations during the war should not be considered. Gold passed double par, and there were exigencies which took the market out of its channel. The highest price during the war was the average of $63.50, in August, 1864, although in gold this would have been but half this figure. There was a decline to $37, in May, 1868, but a large part of this was a decline in gold.

Just prior to the panic in 1873, pig iron at central western furnace sold at $55, and in 1878, just prior to the boom of 1879, it was selling at $18. A part of this was due to the decline in gold, which went from 112 in 1873 to par in 1878; another part was due to the general reductions in the cost of manufacture, which are made once for all, and the remaining part, not so important with these allowances, was due to fluctuation in the cost of manufacture, which will always be present, and to fluctuation in the relation between supply in demand.

In the first three or four months of 1900, Bessemer pig iron was $24 at valley furnace and by October had declined to $17. Considering all factors, this is probably the greatest decline, due merely to market conditions, which has ever occured, since pig iron became a really important market commodity.

It must always be borne in mind, however, that fluctuations in pig iron prices, as they appear from comparisons of price records, do not really represent as great fluctuations in the essence of the market. A high price is always attended by heavy forward contracts; the high price would not come if consumers had not brought far ahead; the actual average of contracts on books at such a time is always considerably below the quoted price. If it were possible to compare the average prices actually received, for the tonnage shipped month by month, the fluctuations would be much less extreme. Furnaces do not obtain the full benefit of the highest prices, while on the other hand they do not stand so fully the brunt of the lowest, because when the market is lowest they generally do not sell so far ahead. Pig iron is, however, a fluctuating commodity and is destined to continue to fluctuate probably about as much as it has in the past.

THE NEED OF TRADE SCHOOLS.

That the labor situation in this country in respect to the supply of skilled workmen is demanding serious attention from manufacturers is shown by the means taken by a large number of concerns to educate apprentices so that, at the end of a given period of instruction, they will be competent to perform any work assigned to them. Various methods to accomplish this end have been adopted by different establishments, each method being designed to fit the needs of the particular concern employing it. As a rule, however, this work has been confined to the larger and more prosperous manufactories, the comparatively small shop being barred from the use of a plan of this character for a number of reasons, prominent among which are expense and the necessity of having a large number of apprentices, in order to make the assignment of an instructor or instructors especially to the apprentices economical.

That the supply of skilled workmen is not being augmented at a rate that the prosperity of the country demands seems to be evident. The method of training apprentices in a great many shops, and probably a majority of them, is not fair to the apprentice nor to the benefit of the employer in the long run. The apprentice is put at one job and kept there until he becomes proficient in it. He is then kept on that one job for a long period, turning out work at a much lower cost than a skilled workman could do it, thus making considerable profit for the employer. The boy, however, is not

learning anything, and oftentimes he is only shifted to another job, or to a different class of machine after persistent importuning of the foreman. This is not conducive to the production of a machinist, molder, or other workman proficient in all branches of his trade.

What is the remedy for this condition of affairs? As hinted above, the larger shops are able to look out for themselves. The smaller shops cannot do this. To provide an adequate supply of skilled workmen for these shops, the trade school seems to furnish the best solution. There are a few of these already established and doing successful work in the making of machinists, molders, brick layers, carpenters and journeymen in other trades. Their number, however, is altogether too limited. The workmen whom they turn out are so much better trained than the average shop trained apprentice that they do not long retain the position of journeyman, but rapidly advance to the position of gang boss, shop foreman, department foreman, or general shop foreman, and the need of the workmen to run the machines, or do the actual labor of construction is felt as sharply as ever. There can be no doubt of the fact that the men trained in a trade school are far superior to the average young man who has passed four years of his apprenticeship in some manufacturing establishment. The instruction in the trade school is balanced between thorough practical work and enough mental work to develop the man's intelligence and to give him all the knowledge which is essential for his work. Furthermore, the student at a trade school is not kept on useless repitition work, but, as soon as he masters one part of his course, he passes on to another and, at the end of his time, is a thorough, broad-minded, all-around mechanic.

The establishment of trade schools has usually been violently opposed by the labor unions. This would seem to be in accordance with their policy of limiting the number of apprentices in a shop. It may be also that the quality of workmen turned out by the trade school is obnoxious to the union, as the graduate of such a school is intelligent enough to think for himself and not to submit to the dictates of any demagogic labor leader. The arguments advanced against the trade schools by the unions are usually of the weakest character and should have no consideration whatever. The great success attained by the comparatively few schools already established should lead to the founding of many more in all parts of the United States.

BRITISH IRON PRODUCTION INCREASED.

The output of pig iron in the United Kingdom in 1906 broke all previous records. A statement of this sort cannot be made so often with respect to the British iron industry as it can with respect to the American industry, which breaks records more frequently than not. In the past quarter century, there have been but nine years in which pig iron production in the United States has failed to break all records. In the same period, British pig iron production has broken its best previous record only six times. The following are the British Iron Trade Association statistics; the government statistics are slightly different:

British Pig Iron Production.

	Gross tons.
1898	8,681,071
1899	9,305,319
1900	8,908,570
1901	7,851,830
1902	8,517,693
1903	8,811,204
1904	8,562,658
1905	9,592,737
1906	10,149,388

The year 1906 showed an increase of 556,651 tons over 1905, the best previous year, that year in turn having shown a gain over the previous record, made back in 1899, of 287,418 tons.

The official statistics for the United States and Canada have been issued, as well as the provisional statistics of the German Manufacturers' Association, so that the following comparison can be made, the German figures of metric tons being reduced to gross tons:

Pig Iron Production.

	—Gross tons—	
	1905.	1906.
United States	22,992,380	25,307,191
Germany	10,813,979	12,280,877
United Kingdom	9,592,737	10,149,388
Canada	468,003	541,957
	43,867,099	48,279,413

This shows a gain of 4,412,314 gross tons by the four countries in a single year, of which increase the United States supplied a trifle over half, as it should, seeing that its production in 1905 was a trifle over half the total of the four countries. It is not often that the other countries have kept pace with the increase in the United States. The production of all other countries than the four named above was in 1904 about 9,700,000 gross tons; without any increase in the two years by these countries, the world's total pig iron production last year would have been 58,000,000 tons; as a matter of fact, these other countries probably increased their production by a million tons, so that it may be assumed that in 1906 the world made about 59,000,000 gross tons of pig iron. This compares with 40,170,000 tons in both 1900 and 1901, with 27,000,000 tons in 1890 and with 4,400,000 tons in 1850. The world's production has more than doubled in 15 years; in 56 years the world's production of pig iron has increased by 1,240 per cent; the increase in iron of commercial utility has not been so great, as in 1850 much iron was produced direct from the ore, not going through the intermediate form of pig iron.

EXPORTS' GREAT GAIN.

Exports of manufactures from the United States now exceed $700,000,000 per annum and have doubled in value in a single decade, says a monograph just issued by the Bureau of Statistics of the Department of Commerce and Labor, entitled, "Exports of Manufactures from the United States and Their Distribution, by Articles and Countries, 1800 to 1906." In 1880 manufactures formed but 15 per cent of the total exports of domestic products; in 1890 they formed 21 per cent, in 1900, 35 per cent, and in 1906, 40 per cent. This rapid increase in the exports of manufactures from the United Sates has brought her to the third rank in the list of the world's exporters of manufactures. The exportation by the United Kingdom was $1,400,000,000 and Germany $1,000,000,000.

ANNUAL CONVENTION

Of the National and Southern Supply and Machinery Dealers and the American Supply and Manufacturing Association.

The annual meeting of the National Supply and Machinery Dealers' Association will be held at the Hotel Sinton, Cincinnati, May 8, 9, and 10. At the same time, the annual gatherings of the Southern Supply and Machinery Dealers' Association and the American Supply and Manufacturers' Association will be held. This will afford the supply and machinery dealers of the country an unusual opportunity of meeting the representatives of more than 200 manufacturers, whose products they sell.

The program, which was arranged at the special meeting of the executive committees of the three organizations, held in Cincinnati, provides that practically the entire time will be occupied with the reading of papers and discussions of trade matters. The opening session, Wednesday morning, May 8, will be the only open meeting of the gathering. An address of welcome will be made by the mayor of Cincinnati, and addresses will be made by presidents Strong, Reichlin and Moyer. T. J. Fernley, secretary-treasurer of the National Hardware Association, will discuss "Association Work." In view of Mr. Fernley's wide experience in the hardware trade, where conditions have been somewhat similar to those existing in the supply and machinery trade, his address should prove unusually interesting. The executive sessions of the three boards will be held Wednesday afternoon, and they will then meet in a joint executive session on Thursday morning and will resume separate meetings in the afternoon. Friday will be similarly occupied. A banquet had been arranged for Thursday evening, and among the toasts are the following: "Cash Discount;" "Re-Selling Prices;" "Cost of Doing Business," and "Relations Between Dealer and Manufacturer." Invitations will be extended to officers of the American Hardware Manufacturers' Association, the National Hardware Manufacturers' Association, and the Southern Hardware Jobbers' Association.

A Record in Relining.—The Lackawanna Steel Co., Buffalo, has made more than one record in connection with its blast furnaces recently, the last noteworthy one being in connection with the No. 1 furnace. It was blown out on Monday, Feb. 25, at 10:30 p. m., and was again charged on March 16, and blown in two days later after a complete relining from hearth to top. This means a record of a little less than 21 days.

MINING TAXATION

Meets With Favor in Canadian Legislature.—Exemption For Native Iron.

Toronto, Canada, March 23.—The bill for the taxation of mines and mineral lands introduced in the Ontario legislature as a government measure by Hon. Frank Cochrane, minister of mines, has passed the committee stage, which virtually secures its adoption. The details as to the amount of the tax to be imposed were made public for the first time. The tax on producing mines is fixed at 3 per cent of the net profits on all amounts over $10,000 per year, no tax being imposed until that figure is reached. The original intention was to have increased the percentage according to a sliding scale as the profits increased, but owing to the strong protests of the mining interests this feature was abandoned and a flat rate of 3 per cent substituted. Mining locations in unorganized districts are subjected to an average tax of 2 cents per acre. A new clause added to the bill provides for the remission of the tax on iron ore where such ore is smelted in Canada.

The Canada Foundry Co., Toronto, has recently received large orders in connection with railway construction and equipment. These include contracts from the Canadian Northern railway for 15 locomotives, of 10 wheels, weighing 140 tons each, and 25 locomotives of the consolidated type, weighing 150 tons each; from the Canadian Pacific railway for four 90-ton Bucyrus steam shovels, duplicating a previous order; and from J. D. McArthur, contractor on western lines, for a 70-ton Bucyrus steam shovel. Contracts for the construction of steel bridges for the Canadian Northern, and Tenuskaming & North-Ontario railways have also been awarded to this firm. The force of men employed by the Canada Foundry Co. is being steadily increased in view of the extension of the industry so as to embrace new lines. About 1,900 men are now steadily employed, an increase of 50 as compared with this season last year.

The Dominion Iron & Steel Co., Sydney, N. S., is making good progress in boring for coal on the Burchell areas and other properties recently secured at Point Aconia, near its works. A large staff has been engaged in boring for about two months and recently struck a 7 foot, 2 inch seam with a surface of 156 feet.

A steady influx of immigration mostly bound for Western Canada and including a large number of railroad laborers has set in. A party of 700 laborers for the Grank Trunk Pacific went through to Fort William this week and others have arrived at Montreal.

John B. Jackson, Canadian commercial agent at Leeds, England, reports to the department of trade and commerce that if Canadian pig iron were made more uniform, so as to approach the Swedish standard it would bring 50 per cent more in England than at present. The present grades of Canadian pig arriving at Liverpool are of exceptionally high order, and English manufacturers always give Canadian pig iron the preference over the common warrant iron produced at Middlesborough. Manufacturers are almost unanimous in stating that if Canadian exporters would only make a closer study of British requirements, and produce a uniformly graded metal, their trade would increase ten-fold and prices would soon approximate those of Swedish iron.

Duncan McGregor, an old resident of Smith's Falls, Ont., and member of the firm of Johnston & McGregor, stove manufacturers, died suddenly on March 9, aged 63 years.

The Peholea Bridge Co. has been incorporated with head office at Peholea, Ont., and $40,000 capital, the incorporators including John Fraser, Thomas Johnstone and Wm. H. McKenzie.

A. F. A. CONVENTION.

Dr. Richard Moldenke, secretary of the American Foundrymen's Association, announces that the Bellevue-Stratford has been chosen by the Philadelphia entertainment committee as the social headquarters for the May convention, in order to facilitate the making up of parties for the several trips contemplated. A list of hotels, together with rates, is also included. It is further stated that reduced railroad rates on the certificate plan are practically assured, western railroads alone awaiting definite action on 2-cent legislation before granting the application of the association.

Ties Not "Ingots."—The board of United States general appraisers held a recent decision that steel ties cannot be considered ingots, within the meaning of that word as used in the Dingley tariff. The collector classified the ties under the provision in the law for structural steel shapes and levied duty at the rate of 5-10 of a cent a pound, whereas the importer's contention for duty as ingots carries only 4-10 of a cent a pound tax. The decision says that while the ties may have once been ingots, they are now several steps removed from that condition.

MUTUAL DUTIES

Of Public and Railroads Discussed by President Finley

"There is danger that legislation intended to regulate railways may prove to be an obstacle to their extension and development and may tend to make worse instead of better conditions sought to be remedied," said President W. W. Finley of the Southern Railway Co., responding to a toast at the annual banquet of the Atlanta Chamber of Commerce, Atlanta, Ga., March 19. "An example of this is legislation proposing to impose penalties for failure to supply cars or to perform other services, without regard to whether such failure is the result of willful negligence. Just at this time, owing to the tremendous expansion of the business of the country, the demand for cars is beyond the capacity of the railways and the car builders to supply, and some states propose, by so-called 'reciprocal demurrage' laws and the imposition of penalties, to compel discrimination by the railways in favor of shipments wholly within the borders of the state. It must be apparent that the inevitable result of this will be to bring about a competition of greed and rivalry between the states to see which can impose the heaviest penalties and secure the largest supply of cars and the most prompt service, and that every penalty imposed for failure to do the impossible, must reduce the ability of the road to secure more cars and other needed betterments. It must also be apparent that such a policy is in direct violation of the common law rule forbidding discrimination, which has been incorporated in the Federal and State statutes. It compels discrimination in favor of transportation wholly within the state imposing the heaviest penalty against other states and against interstate traffic. This is a matter of great importance to the people of Georgia, for by far the larger proportion of the shipments originating in this state are carried across state lines, so that, while a penalty law in Georgia more severe than those in other states might compel discrimination in favor of shipments within the state, it would be detrimental to Georgia business interests as a whole.

"In this matter and others which it is proposed to regulate by legislation it is for the best interest of all concerned that the relations between the railway and those buying transportation from it should conform to the well-established business rules that govern commercial transactions of all kinds. There seems to be an idea in the minds of some that the business of transportation by rail is so different from all other forms of human activity and that the railway corporation is so different from all other business concerns that they should be hedged about with restrictions which would be recognized as being fatal to the success of an individual or corporation engaged in any other business."

Continuing, President Finley said:

"While the people should realize that efficient railway service is necessary for their own advancement and that the railways should not be put in a position where they may simply be the prey of those seeking selfish ends, it is equally important that railway owners and managers should understand that the property of a railway can be permanent only when it is built on the solid foundation of prosperous communities and when it enjoys the good will of all the people whom it serves. This involves, on the part of every railway man, from the president to the flagman at the street crossing, a zealous devotion to his duties and a constant effort to give to the road, and, through it, to the public, the most efficient service of which he is capable. It involves a recognition of the community of interests between the railway and the public and an earnest endeavor to serve all those doing business with the road with fairness and courtesy. This is the policy that I am determined to have observed on the lines of the Southern railway, and, at a recent gathering of representatives of the freight and passenger departments of the road in this city, I outlined clearly what is expected of all its officials and employes in their dealings with the public."

Erie Stops Work.

All work of construction by the Erie railroad, which has been under way in New York state for the past year, will be stopped until further notice, according to an official statement just issued. The principal reason for the action as given in the statement was that "within the past two weeks it has been found likely that the policy of the state of New York will be entirely reversed with respect to the control of subsidiary corporations, and also that other burdensome legislation is proposed."

Study Locomotive Economy.

The Pennsylvania system is investigating the problem as to how many miles a locomotive should make before being sent to the shop, irrespective of whether it is broken down or not. An expert engineer is studying the problem and is making exhaustive reports on the mileage that can be made economically by a locomotive before it should be sent to the shops for an overhauling. When this mileage is determined, orders will be issued to send every engine to the shops when it makes the specified run, regardless of its general condition.

BELATED INQUIRIES

Being Made for Machine Tools.—Chicago Market.

Office of THE IRON TRADE REVIEW, 1632 Monadnock Block, March 26.

Belated inquiries by firms which contemplate moving or enlargement of plants on May 1 have kept the machine tool men busy during the past week. Small shops which have not kept in touch with the conditions of the machinery market are waking up to find that projected improvements have become impossible unless put far into the future. In wood working machinery little change is apparent. Demands for second hand machines are still exceeding the visible supply.

"The only ones busy in our place," said one manufacturer, "are the stenographers. They are rushing out letters refusing orders."

A list of tools was sent to local houses during the week by H. P. Latta, superintendent of construction of the Mobile, Jackson & Kansas City railroad. His office is at Mobile. The list includes one each of the following:

Ten-inch boilermaker's flanging clamp, flue cleaning machine, flue welder, flue furnace, hand pump to test up to 300 pounds hydrostatic pressure, 42-inch double head boring mill, 36-inch radial drill, 60-inch radial drill, 14-inch Fox lathe with 3-jaw universal chuck, 18 x 6-inch change-gear screw cutting lathe with 4-jaw universal chuck, 16 x 10-inch patternmaker's lathe, 16-inch plain screw cutting lathe with 4-jaw universal chuck, 24-inch shaper, 15-horsepower vertical engine, 25-horsepower vertical boiler, submerged flues; outside molder 4 x 16 inches, small tennoning machine for sash and doors, small mortise machine for sash and doors, band saw filer and set (automatic, hand or power).

CRUCIBLE STEEL REPORT.

The following statement of the net earnings of Crucible Steel Co. of America just compiled for the six months ending Feb. 28, 1907, shows a balance of $1,257,917.32 and a surplus for the half year $524,822.32. The statement as given below is based on inventory values as of Aug. 31, 1906, for all finished material. Raw and process material is valued at cost to the company as of Feb. 28, 1907.

Total net earnings after deducting all expenditures for repairs, interest on mortgages, etc.....		$1,283,589.10
Less amount set aside as reserve for contingencies		25,671.78
Balance of net earnings.....		$1,257,917.32
Dividends on preferred stock—		
No. 17, 1¾ per cent to Nov. 30, 1906.	$366,547.50	
No. 18, 1¾ per cent to Feb. 28, 1907.	366,547.50	733,095.00
Surplus for half year.....		$ 524,822.32

Announcement was made at the annual meeting of the stockholders of the Union Switch & Signal Co. that the remaining 5,000 shares of new stock allotment had been subscribed for by the stockholders. This is the last of the present allotment of new stock. The sale of 5,000 shares of new stock reimburses the treasury by $400,000, the stock, $50 par, selling for $80 a share.

HIGHER WAGES.

Union Molders and Core Makers Present Demands.

The union molders and core makers employed in Indianapolis foundries have made demands upon their employers for a nine-hour day and the following minimum: Floor molders, $3.10; bench molders, $2.90, and core makers, $2.60. The union foundries have been recognizing a minimum rate of $3.10 for a ten-hour day during the past year. No written agreement has been in effect at this place since January, 1904.

The union molders at Dayton, have voted to demand a ten per cent increase in the present rate and a reduction of hours from ten to nine. The lowest rates now paid journeymen floor molders at Dayton ranges from $2.75 to $3.05. Journeymen bench molders are being paid from $2.50 to $2.80. No written agreement has been in effect for several years, and foundrymen have decided not to grant the demands.

The molders employed in foundries at Williamsport, Pa., and vicinity, demand a written agreement for a year providing for a minimum rate of $2.75, and a minimum for core makers of $2.50. A reduction in the number of hours for molders from ten to nine is also asked. These demands also include an increase of 25 per cent on all piece work prices and the recognition of the price committee.

The union molders and core makers employed in shops at Salem, O., have renewed their demands for a $3.00 minimum which was made in September, 1906, but not granted.

It is reported that the union molders employed in New York and Brooklyn foundries do not contemplate making any collective demands this spring.

The Iron Molders' union, by a recent vote of its members has decided to hold a national convention in Philadelphia in July. The last convention of this organization was held at Toronto, Ont., in July, 1902. In suggesting matters that should come up for consideration, *The Iron Molders' Journal* raises the question whether the constitution of the union may not be strengthened and the efficiency of the organization improved. A change in policy relating to the molding machine is one of the proposals that will be considered, and it is intimated that the possibilities of accomplishing increased dues will have attention. Strike benefits and other expenses of the national organization in 1906, apart from the large sums spent by the local unions, are reported to have amounted approximately to the sum of $750,000.

The union molders of Chicago are circulating a ballot in the shape of a card, the vote on which will undoubtedly decide whether or not the demands for higher wages are to be presented to the foundrymen of that city this spring. The men are asked to decide between a written and verbal agreement; present scale of wages; number of hours, and whether or not these matters are to be left in the hands of a committee which will confer with the foundrymen.

Labor Notes.

The Dunbar Furnace Co., Dunbar, Pa., has announced an advance in wages affecting about 600 of its employes. An increase of about five per cent is given all the skilled labor of the furnaces, the Sement-Solvay coke plant, the sand works and the New Haven & Dunbar railroad. Common labor is increased from $1.45 to $1.50 per day. The wage scale of the company is based on the price of iron. The company gave its employes two voluntary advances last year aggregating about 13 per cent.

The Scottdale Furnace Co., Scottdale, Pa., has announced a voluntary raise in wages ranging from 10 to 40 cents a day, or an average of 15 per cent, affecting 225 employes. The Elkins Coal & Coke Co., Morgantown, W. Va., also granted a 10 per cent increase to coal miners and cokemakers. The order affects over 1,000 men.

OBITUARIES.

W. A. Hughes, for years purchasing agent for the Pullman Co., Chicago, died recently. He was an Englishman and came to the United States in 1886 to work for the company. He held various positions until promoted to the post he held at the time of his death. His work made him acquainted with many of the dealers in machinery and iron. He is survived by a widow and two children.

Joseph Allen Starkey, aged 83, for more than half a century identified with the iron and furnace interests in the east and west, died at the home of his daughter, Mrs. William T. Mottram, in Milwaukee, March 16. Before the war Mr. Starkey had charge of the blast furnaces of the Brier Hill Iron & Coal Co., and when that conflict ended he located at Wheatland, Pa., entering in the blast furnace business. In 1872 he was sent to South Chicago to take charge of the furnaces for what is now the Illinois Steel Co. In 1879 he went to Milwaukee to take charge of the company's furnaces at Bay View.

PERSONALS.

Albert Sheeler has been made manager of the Republic Iron & Steel Co.'s plant, Muncie, Ind., succeeding J. M. Stetter, who goes with the Graham Nut Co., Pittsburg.

Porter S. Stover, vice president of the Stover Engine Co., Freeport, Ill., has gone on an extended trip through European countries in the interest of his company.

D. B. Meachem, of Rogers, Brown & Co., and J. A. Green of Matthew Addy & Co., of Cincinnati, O., have returned from a trip to Panama. They were members of the Commercial Club excursion.

Lewis H. Morgan, general manager of the Ridgway Machine Tool Co., Ridgway, Pa., which was recently taken over by the Niles-Bement-Pond Co., has resigned and will retire from the machine tool business.

N. L. Hayden, general manager of the N. L. Hayden Co., Columbus, O., manufacturer of metallic packing, valve goods and railway supplies, has resigned to become general manager of the Warren Electric Co., Sandusky, Ohio.

D. F. Morgan, who has been chemist at the Star furnace, Jackson, O., for the past seven years, has resigned, effective May 1, to accept the position of general manager of the new blast furnace now being built by the Jackson Iron & Steel Co.

J. R. Lovejoy has been appointed general manager of the sales department of the General Electric Co., with headquarters at Schenectady, N. Y. Mr. Lovejoy is a graduate of the scientific department of the Ohio State university.

Harry F. Allen has resigned as treasurer of the Fitchburg Machine Works, Fitchburg, Mass., to become connected with Fairbanks & Co., New York. He is succeeded by G. H. Byer of Readville, Mass., who had previously held a prominent position with the Stafford Mfg. Co.

Clyde M. Carr, vice president of Joseph T. Ryerson & Son, returned to Chicago last week from a visit to Panama and the canal zone. He went with a party from the Chicago Commercial association, which made a trip across the isthmus to inspect the work and study trade conditions and possibilities.

William A. Rogers, of the firm of Rogers & Co., is building an elegant summer home at Kennebunk, Me., where he and his family will spend their summers. Mr. Rogers purchased a large estate on the coast which bears landmarks of the early Indian wars. The new home will be completed in June. It is of the English Elizabethan architecture. Mr. Rogers' home is in Buffalo.

NATIONAL METAL TRADES CONVENTION.

RAPID GROWTH DURING THE PAST YEAR.

Highly Successful Meeting in Historic Boston.— Enthusiastic and Harmonious Proceedings.— Business Rapidly Transacted.

Judged from any viewpoint, the annual meeting of the National Metal Trades Association, held at the Hotel Brunswick, Boston, March 21 and 22, must be considered one of the most successful in the organization's history. It is not that the gathering was called upon to handle a great mass of business; most of that had been cleared away by the administrative council in the two days previous to the opening of the convention. But those matters which were brought to the attention of the general body were of vital importance to the future of the organization, and on them opinion was enthusiastic and unanimous. There was not the slightest trace of hestitancy in any move which promised to further the association's progress. The council had mapped out the way which in its opinion seemed best; the members listened to its recommendations and accepted them with such acclaim as to leave no doubt of the thorough support accorded the administrative officers.

The report of commissioner and president showed a phenomenal growth during the past year, both in point of membership and number of operatives. Recognition was taken of the fact that the association had, in a manner, outgrown its bounds and that a revision of the laws by which it is governed must soon be made. The matters arising to confront the organization during the year presented difficulties less formidable than in some previous years, but still were sufficient to keep its forces in a healthy, vigorous condition, at the same time permitting of some attention to widening the field of activity and usefulness. As to what the future may bring, it was made clear that the association was never in better shape to cope with whatever emergencies may arise. Everywhere through the gathering were evidences that it has been wisely guided and that it is worthy of the place it occupies—in the forefront of industrial organizations.

As to the convention itself, Boston must be given credit for being the most pleasing of hosts. By extraordinary efforts, the committee on arrangements overcame many difficulties, including the important one of inadequate hotel accommodations, and made the visitors feel that the Massachusetts city is anything but the cold, reserved, culture-burdened place which reputation would have it. Its many historic spots consumed the few leisure hours of the attendants and there remained much which could not be seen, for the convention was eminently one of business. Secretary Wuest's complete arrangements for expediting business and assisting press representatives in their work were characteristic of his record as an efficient officer.

The Opening Session.

When the convention was called to order Thursday morning by President Sayle, the usual custom of dispensing with the roll call and the reading of minutes was followed. Hon. John F. Fitzgerald, mayor of Boston, was then presented to welcome the convention to the city. In a vigorous, witty speech, frequently interrupted by cheering, he made it clear that Boston, "the metropolitan home of five millions," was the most genial of hosts and that it found real pleasure in offering itself as the meeting place of the association. He referred to the widespread scarcity of labor throughout the country, coupling with this a plea for the continuation of the immigration movement by fostering it in every legitimate way. He took occasion to score the financial methods of certain leaders in the money world, particularly Mr. Harriman. The country does not believe, he declared, in the action of a man in making eighty millions out of eighteen millions without adding a dollar to wealth in general. That, he averred, is the reason of the widespread support accorded President Roosevelt, who is not opposed to the railway with honest assets and honest management. A patriotic plea for a bigger, busier and better America closed the address and three rousing cheers were given for Boston. The speaker responded by leading in three cheers "for the United States, the greatest country in the world."

"And Canada," called a delegate, as the mayor was introduced to C. Bermingham, manager of the Canadian Locomotive Co., Ltd., Kingston, Ont.

Committees Appointed.

President Sayle then proceeded with the routine work of the convention, the first of which was the announcement of committees. These were as follows:

Convention.—O. B. Kinnard, Kinnard-Haines Co., Minneapolis; J. H. Webster, Variety Iron Works Co., Cleveland; F. D. Wanning, Birmingham Iron Foundry, Derby, Ct.; J. P. Bird, Hobbs Mfg. Co., Worcester, Mass., and E. C. Henn, National Acme Mfg. Co., Cleveland.

Ways and Means.—F. C. Caldwell, H. W. Caldwell & Sons Co., Chicago; W. S. Hallowell, Harrison Safety B. Works, Philadelphia; Si. P. Egan, J. A. Fay & Egan Co., Cincinnati; D. B. Kirk, C. & G. Cooper Co., Mt. Vernon, O., and J. C. Hobart, Triumph Elec. Co., Cincinnati.

Auditing.—A. H. Bullard, Bullard Mach. & Tool Co., Bridgeport, Ct.; Walter Medart, Medart Patent Pulley Co., St. Louis, and F. Macomb Cresson, Geo. V. Cresson Co., Philadelphia.

Constitutional Amendments.—C. S. Bonsall, Buckeye Engine Co., Salem, O.; E. E. Hanna, Hanna Engineering Co., Chicago; Jos. Reid, Reid Gas Engine Co., Oil City, Pa., and J. Kirby, Jr., Dayton Mfg. Co., Dayton, O.

Hours and Wages.—A. B. See, A. B. See Elec. Elev. Co., New York; H. H. Latham, Latham Mach. Co., Chicago, and Geo. W. Jackman, Springfield Mfg. Co., Bridgeport, Ct.

Strikes and Lockouts.—William Kehoe, Wm. Kehoe & Sons, Savannah, Ga.; Julius G. Day, Whitlock Prt. Pr. Mfg. Co., Derby, Ct., and Geo. W. Watts, Canada Foundry Co., Toronto, Can.

Nominations.—H. N. Covell, Lidgerwood Mfg. Co., Brooklyn; J. W. Gardner, Gardner Governor Co., Quincy, Ill., and W. D. Sayle, Clev. Punch & Shear Works Co., Cleveland.

After the announcement of committees, President O. P. Briggs, of the National Founders' Association and President J. W. Van Cleave, of the National Association of Manufacturers, were escorted to the front of the convention hall and spoke briefly.

On the call for resolutions, J. M. Manley, secretary of the Cincinnati Metal Trades Association, introduced a lengthy resolution referring to proposed constitutional amendments and this was placed in the hands of the proper committee.

President Sayle's Report.

The remainder of the morning was

NEWLY ELECTED OFFICERS AND COUNCILORS OF THE N. M. T. A.

T. Phillip Bird. Wm. Lodge. P. B. Kennig. F. K. Copeland. Cornelius Bermingham. M. H. Barker. M. K. Bowman. O. B. Kinnard Robt. Wuest.

largely given over to the presentation of annual reports, all of which were complete, reviewing in detail the work of the association during the past year. They were uniformly favorable and were listened to with keenest interest. The first to come before the convention was the report of President Sayle, who spoke as follows:

President Sayle's Report.

"It gives me great pleasure to welcome you to our ninth annual convention. It is gratifying to know that notwithstanding the exceeding number of miles that it has been necessary for a large number of you to travel, you have laid aside your business and are now here to take up the business cares of your association. This augurs well for the success of this movement, and the measure of such success is due entirely to the interest and loyalty of the individual membership, as proper conclusion can only be reached by thorough investigation and full discussion of the question under consideration.

"I wish to congratulate the National Metal Trades Association upon its phenomenal growth during the past year, such growth being due entirely to the earnest work of the membership in establishing branch associations and thereby creating local sentiment in favor of the national organization. The evidence of this interest and loyalty of our membership is splendidly exhibited by the representative body which has enrolled itself as being present at this convention.

Local Associations.

"The past year has been a year of unequaled prosperity and productiveness, and while serious strikes have occurred in other lines, on all sides of us, we have been comparatively free from industrial turmoil. The only trouble that we have experienced during the past year has been in manufacturing centers where only recently interest in our work has been aroused and where only recently a branch association has been formed. This absence of wide-spread labor agitation at such a propitious time for the walking delegate is due, I can fairly say, to the moral influence of the greatest defensive organization there is in existence in the world today. The existence of this great defensive organization is due not only to the loyalty of individuals, but to the loyalty of the combination of individuals as evidenced by our local associations as they exist today. We have in all now established 15 local associations, and I have found them to be earnest in their work and loyal in their duties. To the local secretaries too great praise can not be given; they have rendered their assistance in every way possible, not only in the procuring of men through their labor departments, in the exigencies of strikes, but in disseminating the truths and underlying principles as promulgated and defined in our declaration of principles. I wish to congratulate the association on the adoption of the scheme of branch associations, as I believe the branch associations are of great assistance to the national in the maintenance of industrial peace and the national association, acting as the headquarters and clearing house for the branches, makes it possible for them to keep in touch with the entire labor situation in all parts of the country. Without the national association, the locals could not hope to continue long as successful organizations, and without the locals the efficient work of the national would be somewhat curtailed.

Growth of the Association.

"The many questions to be decided by this convention will be taken up in due time and in the regular order of business, and I am sure will be thoroughly discussed and decided for the best interest of the association. I wish particulary to call your attention to the immense responsibilities of our organization, and in illustration will state that we have now employed upwards of 65,000 operatives listed under the National Metal Trades schedule, from which can be reckoned at a low average rate of $2.50 per day, that we have a daily pay roll of $160,000. I feel sure that it is fair for me to presume from the above figures that the National Metal Trades Association holds the adjustment of the future welfare of the metal trades within its counsel. In justification of my statement, I will venture to state, without contradiction, that should the National Metal Trades Association, through its membership, decree that eight hours should constitute a full day of labor, or should adopt any other curtailment of employment, then every other manufacturer in the country would be compelled to abide by such decision. Could greater responsibility be placed on any association than that which you are called upon to assume?

Mr. Eagan's Illness.

"It is with exceedingly deep regret that I am compelled to announce to this convention that Commissioner Eagan, on account of continued illness, has been compelled during the past year to lay aside his duties as commissioner. The officers and membership of the association have greatly missed his energetic efforts and wise counsel. We still hope to have him with us as his heart is in the work and his mature judgment has helped us to bridge many a chasm which at first looked impossible. During the absence of Mr. Eagan the affairs of the association have been in charge of Acting Commissioner Wuest, who has performed his strenuous duties in a most efficient manner and to the entire satisfaction of the parties interested.

New Department.

"The extra work caused by the extraordinary increase of our membership made it necessary for us to increase our office force; therefore Mr. J. V. Wright was selected, and at the October meeting of the council was given the title of assistant commissioner. It is believed that Mr. Wright is exceptionally adapted for our work. We have also during the past year, established a new department to be called the auditing department, placing Mr. Nelson W. Dingwall in charge. The object of this department is to properly enlighten our members on the manner of reporting their operatives under our schedule, and to in other ways, bring the members closer to his National Organization.

Pernicious Bills.

"The activity of the union element has been much in evidence in our halls of legislation during the year, and it has been a severe tax upon our citizens to keep in touch with the many pernicious bills that have been placed for enactment so that efficient steps could be taken to kill or at least shear them of their objectionable features. It is a queer commentary on our legislators that they are ever ready to attach their names to and lend their aid in placing before the bodies in which they are members, all of the pernicious and silly labor bills, presented by union labor; while the member is hard to find who will have the courage to stand up before his colleagues and condemn what he knows to be wrong and a great injustice to the employing interests, and to that great army of free and independent workmen who have not bartered their liberties to the walking delegate who are known to all right thinking individuals as freemen and whose members vastly exceed the number enrolled in labor organizations.

"This state of affairs emphasizes the well-known fact that the employer and freeman must look out for their own interests, as the legislator whom they send to the state legislature does not consider them at all, nor does he consider that their interests have any place in the halls of legislation. Should you criticise him for such an opinion? The labor representative places before him the usual arguments and misrepresentations pertaining to the conditions of labor and its employment. The manufacturer is busy seeking to satisfy the demands of business and to meet his financial obligations both as to material and labor, and for that reason has no time to spare. With all arguments in, how will the jury decide? The decision will undoubtedly go with the weight of testimony. We must, therefore, be awake to our interest

and keep our organization compact and alert, if we wish to get our share of justice. For there is no justice without organization.

Generous Assistance.

"I desire to thank the membership for the assistance and counsel that they have given so freely during the past year. My duties have been pleasures, made so by the kind attention of the members with whom I have come in contact. An organization composed of such material must and will succeed.

"In conclusion I desire to call the attention of the membership to our declaration of principles and to firmly impress upon your mind that the National Metal Trades Association is not primarily a fighting organization, and that the greatest good performed by our association, as evidenced by the activity of our officers, is not, as would seem apparent, measured by the successful combatting of unjust strikes, but is due more to the successful efforts of our officials in preventing strikes; their efforts being greatly encouraged by our membership and assisted by the knowledge that the National Metal Trades Association never undertakes to solve a problem until after all the facts of the same have been presented and carefully weighed; judgment is then rendered and a line of action defined. This I believe to be the only proper course to pursue, as it would be a very easy matter for a great association like our own, which has the strength to do what it wills, of allowing its strength to overbalance its judgment and thereby causing it to do and act contrary to the right principle of justice.

"It is a common saying that 'Might is Right.' I therefore say to you, judging from the strength of our organization and its policies, that 'Might and Right are Doubly Right.'

"With this evidence of strength and fair dealing I look to see our association increase in membership and influence to such an extent that it will dominate to a full degree the manufacturing interests of this country."

The Association's Finances.

The report of the treasurer, Wm. Lodge, of the Lodge & Shipley Machine Tool Co., of Cincinnati, gave a detailed statement of the financial operations of the year. This was eminently satisfactory from every point of view and showed that the association has on hand an extremely large working balance, after meeting the heavy obligations of the past twelve months. This report, as is customary, was referred to the auditing committee.

Report of the Commissioner.

In an exhaustive report Secretary Wuest, acting commissioner throughout the year, owing to the continued enforced absence of Commissioner Eagan because of ill-health, summed up in detail the progress of the association during the year. The various labor difficulties with which the organization was brought face to face were reviewed at length, their causes outlined, and the method of combating them and their outcome reported. Perhaps the most prominent feature of this review was the large gains in point of individual membership and operatives recorded during the year ending March 1. A number of local organizations have recently become members of the association and these have shown uniformly heavy gains since their alliance with the national body. The report was naturally of considerable length. Its essential features are given below:

"That the National Metal Trades Association has come to stay, is acknowledged, if for no other reason than that its members appreciate the fact that their commercial lives would be made a burden by some labor leaders were the association to go out of existence. I am confident that, if it were possible for the employers in the building trades, for instance, to acquire such reputation as your association has achieved, they would gladly spend ten times the amount we have. It is, therefore, fair to presume, that with continued growth and success, your association's work will prove still more effective and very much less expensive in time to come, its mere existence being a good business proposition, since it causes leaders of labor to pause and reflect before calling strikes in the shops of its members.

Small Cost of Membership.

"That any member should question the value of his membership because of his inability to observe an immediate benefit is inconceivable to those familiar with the practical workings of the association and its influence; especially so, since our assessments for the past year, amounting to $2.80 per annum, per operative, (inclusive of the special assessment levied by the administrative council at its October meeting, and which was billed on December 1) amount to less than one-half of one per cent per annum of the average operative's earnings. This is actually considerably less than one-third of the amount paid by the members of labor organizations to their unions.

Work of a Busy Year.

"The past year has been the most strenuous in the history of the association, its officers having handled labor difficulties for thirty-one of its members, involving 2,925 employes, at a cost amounting to approximately $82,588.27. I believe I am perfectly safe in asserting that it would have been wholly impossible for any one of the members who were involved to have successfully combated the difficulties themselves as economically or as expeditiously as was done by the association, and just here a statement by A. E. Schaaf, general manager of the Pope-Toledo Motor Car Co., to a prospective member, to the effect that he was convinced that, if his company had been willing to spend five times the amount we did, the same results could not have been obtained in the same length of time, should be of interest.

"Every indication points to the occurrence during the months to come of a greater number of labor controversies than ever heretofore.

Local Associations.

"We have at this time local branch associations in fifteen cities. A comparison of their growth, in both membership and the number of operatives reported, should be of interest:

"Cincinnati, merged with the national association September, 1905, has gained, since the time of merging, in point of members, 100 per cent and in point of operatives 95 per cent.

"Chicago, merged Sept. 1, 1905; membership gain, 140 per cent; operatives gain, 91 per cent.

"St. Louis, merged Sept. 1, 1905; membership gain, 169 per cent; operatives gain, 172 per cent.

"Boston, merged March 1, 1906; membership gain, 27 per cent; operatives gain, 50 per cent.

"Buffalo, merged March 1, 1906; membership gain, 27 per cent; operatives gain, 47 per cent.

"New York, merged March 1, 1906; membership gain, 413 per cent; operatives gain 219 per cent.

"Cleveland, merged June, 1906; membership gain, 169 per cent; operatives gain, 113 per cent.

"Toledo, merged June, 1906; membership gain, 114 per cent; operatives gain, 160 per cent.

"Indianapolis, merged June, 1906; membership gain, 316 per cent; operatives gain, 864 per cent.

"Hartford, merged Sept., 1906; membership gain, 300 per cent; operatives gain, 431 per cent.

"New Haven, merged Sept., 1906; membership gain, 1,400 per cent; operatives gain, 289 per cent.

"Springfield, merged Nov., 1906; membership gain, 1,500 per cent; operatives gain, 117 per cent.

"Pittsburg, merged Dec., 1906, membership gain, 950 per cent; operatives gain, 644 per cent.

"Syracuse, merged Sept., 1906; mem-

bership gain, 199 per cent; operatives gain, 59 per cent.

"Worcester, merged June, 1906; membership gain, 380 per cent; operatives gain, 141 per cent.

The Open Shop.

"It is truly unfortunate that our members do not fully appreciate the advantages which would accrue to themselves by having their employes read the *Open Shop*, which has met with the approval of so many recognized authorities on the question of industrial economics. As a matter of illustrating the esteem in which this publication is held by high class manufacturing concerns, not members of the association, it will no doubt surprise and please the members to know that we have received within the past few weeks, an annual subscription from a non-member for 100 copies to be sent exclusively to the home addresses of its employes.

"Since our last convention there have been issued 120 certificates of recommendation, this increase being wholly due to the labor difficulties combated."

The work of the association in dealing with the important labor difficulties of the members was reviewed in detail. "In addition to the larger strike cases," the report continues, "your officers assisted in many minor matters. In a number of cases demands were presented, but thanks to the advice given by your officers, the executive committees of local branches and the prompt attention of the secretaries in charge of your local branches, in which the cases occurred, the threatened difficulties were forestalled. We are at this time conducting the defense of strikes in the following plants: Shaw-Kendall Co., Toledo Machine & Tool Co., C. E. Sutton Co., Advance Machinery Co., and Toledo Foundry & Machine Co., all of Toledo, O.; Woodward Iron Co., Woodward, Ala., and Gemmer Engine Co., Wabash, Ind.

"Your secretary has in preparation a handbook, covering the maximum and minimum rates of wages paid the different classes of operatives coming under the association's classification, based on the statistical reports received from the members."

The report referred to the continued illness of the commissioner, W. P. Eagan, from whom a telegram under date of March 13, said: "Now located at Esperanza Sanatarium, Altadena, Cal. Feeling much better."

Association Membership.

The total membership in good standing March 1 was 755, a gain during the year of 232 or 44 per cent.

Applications are pending from the following concerns:

American Valve & Meter Co., Cincinnati; Bruce-Meriam-Abbott Co., Cleveland; Wm. Barker & Co., Cincinnati; Fairbanks-Morse Electrical Mfg. Co., Indianapolis; Flather & Co., Inc., Nashua, N. H.; The Garford Co., Elyria, O.; King Brothers, Chicago; Lewis Foundry & Machine Co., Pittsburg; M. C. Lilley & Co., Columbus, O.; Hugh Merrie, The Andrew Messmer Co., Thomas J. Nicol & Co., Wm. Powell & Co., Queen City Brass & Iron Works, Cincinnati; Tabor Pump Co., Buffalo; The E. W. Van Luzen Co., and Murdock Mfg. & Supply Co., Cincinnati.

In conclusion, the report made mention of the efficient work of J. H. Cone, assistant secretary. It noted the engagement of J. V. Wright, first as assistant to Mr. Wuest and later, by action of the administrative council, as assistant commissioner. The securing of Nelson W. Dingwall, of New York, as auditor for the association, was explained and the gratitude of the acting commissioner to the officers and local branches as well as to the individual members was expressed.

The report of Mr. Wuest was received and filed on motion of William Lodge. At its close, J. Kirby Jr., of the Dayton Mfg. Co., Dayton, O., offered resolutions involving certain constitutional charges, chiefly in reference to financial affairs of the association. These charges bore the recommendation of the administrative council, which had considered their wisdom through a special committee, and the resolutions went to the committee on constitutional amendment together with Mr. Kirby for later consideration by the convention. E. F. Du Brul, secretary of the Miller, Du Brul & Peters Mfg. Co., Cincinnati, asked that a hearing be given by this committee to any members interested.

New Position Created.

During the year, as mentioned in the commissioner's report, the office of auditor of the association was created and N. W. Dingwall, of New York, was chosen to fill the place. Of his work to date, a report was made by J. H. Schwacke, of Wm. Sellers & Co., Inc., Philadelphia. Quite a few errors in the listing of operatives had been discovered, he said, in some instances in favor of the member and in several to his loss. Mr. Dingwall was introduced to the gathering and spoke briefly of the objects of his position.

Blocking Iniquitous Legislation.

For the committee on legislation, J. Kirby, Jr., reported that no matters had been referred to its consideration during the year. The report continued:

"The object in appointing the committee was that this association might have a proper committee to which it could refer any communication from any other similar organization touching upon legislative matters and looking to the establishing of a general national committee on legislation composed of committees from the various national organizations of employers and citizens working along the lines of bettering the industrial conditions of the country.

"The desirability of such a national committee or council to look after the matter of legislation inimical not only to the interests of employers of labor but also to the general good and prosperity of the country, is more and more emphasized every day by the fact that labor bills, many of which are unreasonable and unjust, are constantly being introduced in the various state legislatures throughout the country, all emanating from the legal department of the American Federation of Labor and systematically introduced and followed up by the labor agitators in all states."

Extracts from a few such bills were read by Mr. Kirby, who said in conclusion:

"Your committee recommends the appointment of a standing committee for the furtherance of the plan outlined herein, viz: The establishment of a national legislative bureau, and that a copy be furnished each national association with which affiliation in such a plan is desirable."

At the conclusion of this report, J. H. Schwacke, of Philadelphia, explained what had been done to combat iniquitous labor legislation in Pennsylvania. Only recently a body of thirty employers went to Harrisburg just in time to block certain bills framed by union agitators. The report of the legislative committee was adopted as was the suggestion of E. F. Du Brul, of Cincinnati, that the administrative council co-operate with other associations in carrying out the committee's recommendations. He spoke of the fight waged by Cincinnati, Cleveland and Dayton employers in Ohio and advocated the establishment of a central bureau to keep in touch with the situation all over the country and disseminate information on the legislative attempts of labor leaders.

The committee on co-operation with the National Founders' Association, reported through M. H. Barker, of the American Tool & Machine Co.,

Boston, that illness in the committee had prevented it from acting, and it was continued. Through D. D. Russell, of the J. G. Russell Boiler Works, South Boston, announcement was made of a reception arranged for the ladies of the convention at the Vendome, with a dinner and theater party following. This concluded the morning session.

Technical Education.

The brief session of Thursday afternoon was given over entirely to the subject of education as affording relief from the scarcity of labor brought about by rigid limitations of apprentices by the union. Through William Lodge, of Cincinnati, an exhaustive report was presented by the committee on technical education, particular attention being paid to the Winona Technical Institute at Indianapolis, where a number of employers' organizations are now supporting trade schools designed to fit young men for their special needs. The opportunities for the N. M. T. A. to establish a school of this sort at Winona were also emphasized by W. M. Taylor, of the Chandler & Taylor Co., Indianapolis, who announced an offer of the Winona authorities to furnish a two-story brick structure 50 x 200 feet with competent instructors, provided the association would provide thirty scholarships of $100 each for at least four years, equip the building properly and appoint a committee to have entire supervision of the school.

This proposition provoked wide discussion. President Briggs, of the National Founders' Association, told of the promising efforts of that organization with a school of molding at Winona. Among those to speak on the subject were Herbert H. Rice, of the Pope Motor Car Co., Indianapolis, E. F. Du Brul, of Cincinnati, F. C. Caldwell, of H. W. Caldwell & Son Co., Chicago, J. C. Hobart, of the Triumph Electric Co., Cincinnati, S. D. W. Cleveland, of Syracuse, Howard P. Eells, of the Bucyrus Co., South Milwaukee, J. H. Schwacke, of Philadelphia, George N. Pierce, of the George N. Pierce Co., Buffalo, and Fred A. Geier, of the Cincinnati Milling Machine Co., Cincinnati. There was some slight difference of opinion as to the method of procedure, but sentiment was seemingly unanimous in favor of the project and a resolution was adopted late in the afternoon, leaving the matter in the hands of the incoming administrative council with the recommendation that the proposition of the Winona authorities be favorably considered.

The Banquet.

The banquet tendered by the Boston branch of the N. M. T. A. Thursday night was a most impressive expression of the genuine hospitality of the historic city. The menu was elaborate, the floral decorations very beautiful, and the oratory was of a high order, showing keen insight into labor problems by the able speakers, most of whom were members of the legal profession.

F. F. Stockwell, chairman of the committee on banquet, presented as toastmaster of the evening Hon. Alfred E. Cox, of the Atlantic Works, East Boston, whom he described as one willing to sacrifice his time and selfish interests for the good of the people. The introductory remarks of the toastmaster indicated that he had been well described, for his keynote was, "Make fewer dollars and serve the public."

The speakers of the evening were: Lt. Gov. Eben S. Draper, of Hopedale, Mass., who declared that indiscriminate denunciation of corporations is thoroughly unjust and made an earnest appeal for regulation of railroads by the government, but opposed government ownership; James W. Van Cleave, St. Louis, president of the National Association of Manufacturers, who dwelt upon the importance of maintaining the open shop, and urged that the way to prevent vicious legislation is to exert every possible effort to send the right kind of men to the halls of legislation; Hon. Herbert Parker, of Boston, who, with rare and forceful eloquence, described the powers and responsibilities of labor and capital and expressed his conviction that if the two great elements of society knew each other better, conflicts would disappear; and Hon. S. J. Elder, of Boston, who, with wit and eloquence described the dangers likely to arise from great combinations of both labor and capital and expressed his confidence that the people of the republic would find a solution of all the grave problems and establish peace, justice and equity for all men.

An inspiring feature of the evening was the singing with much enthusiasm of patriotic songs.

The Friday Session.

The session of Friday morning, which turned out to be the concluding session of the convention, was largely given over to the hearing of three addresses of timely interest. As it was known that much accumulated business remained for consideration by the association, the suggestion was made at the opening that these addresses be presented by title only with arrangement for their later distribution. Hon. William C. Lovering, M. C., president of the American Mutual Liability Insurance and Contractors' Mutual Liability Insurance companies, took the floor for a brief reference to the paper which he had prepared on "Employers' Liability Insurance." The subject, however, proved one of such interest to the members that, on motion of M. K. Bowman, of New York, it was presented entire. The address was a review of the advantages of the mutual type of insurance and a plea for its wider acceptance.

Samuel F. Hubbard, of Boston, read an extremely important paper on "The Commercial Value of an Industrial Education," dealing exhaustively with the various types of trade schools. These may be established in four ways; by the state in connection with a municipality, as Massachusetts has done through a commission named for that purpose; by the state in co-operation with employers; by private philanthropy; and lastly, by employers alone. Mr. Hubbard has been a careful student of this problem and his discussion was listened to with keenest interest. At its close a vote of thanks was tendered on motion of W. B. Cowles, of Cleveland. This address will appear in full in a later issue of THE IRON TRADE REVIEW.

The reading of papers was here interrupted for the presentation, through J. Kirby Jr., of the report of the finance committee. Fred A. Geier, of Cincinnati, moved that the report be received and H. N. Covell of Brooklyn, made the motion for the acceptance of the recommendations contained. There was no discussion and in less than a minute's time, with a vote both unanimous and enthusiastic, the matters of sweeping importance to the association, which had been recommended only after careful deliberation by the administrative council, were adopted in a manner eloquently bespeaking the confidence of the organization in its administrative body. The action on this report was the signal for a vigorous burst of applause.

Mr. Van Cleave's Address.

James W. Van Cleave, of St. Louis, president of the National Association of Manufacturers, in an address of considerable length, made a plea for some such arrangement among the various organizations of manufacturers and other employers as would secure united action in working out a fair and equitable solution of the problems which labor presents. There will always be organization among the working classes, he insisted, just

as surely as there will be organization among employers. An exceptional opportunity is about to present itself for uniform action on the part of the employers in the establishment of a Foundation for the Promotion of Industrial Peace, through the disposition made by President Roosevelt of the funds of the Noebel peace prize recently awarded him. Mr. Van Cleave voiced an earnest plea that the National Metal Trades Association secure a foremost place in taking advantage of this opportunity, and Mr. Du Brul reminded the convention that as far back as 1901 the association was on record as favoring a national, all-embracing organization for the purposes indicated. On his motion the administrative council was instructed and empowered to co-operate with other associations of employers, with the idea of forming a national federation.

The report of the auditing committee, presented by A. H. Bullard, of the Bullard Machine Tool Co., Bridgeport, Conn., stated that the books of the association were in satisfactory condition and that the financial reports, previously reported, were correct.

Will Change Constitution.

Through C. S. Bonsall, of the Buckeye Engine Co., Salem, O., the committee on resolutions reported that the growth of the association to a point far beyond that anticipated by its founders had rendered certain provisions of the constitution inadequate to present conditions; a general overhauling was recommended. The matter was discussed at considerable length by William Lodge, of Cincinnati, H. H. Latham, of Chicago, J. C. Hobart, of Cincinnati, George F. Brooks, of Worcester, Mass., N. B. Payne, of New York, Fred A. Geier, of Cincinnati, E. F. Du Brul and others. Finally the motion presented by Mr. Brooks, referring the report to the administrative council, was adopted. The council is to appoint a proper committee to undertake the work of redrafting the constitution wherever it is thought necessary, and to assist in this work the committee is to designate a place for hearing the views of individual members. Provision is also to be made for the presentation of opinions by letter.

The growth of the association and the need of methods differing somewhat from those so far employed was also emphasized in resolutions prepared by the administrative council and presented by George F. Steedman, of the Curtis & Co. Mfg. Co., St. Louis. These were to the effect that not more than one member of the outgoing administrative council should be elected to succeed himself each year, the idea being to instill new blood into the management of the association's affairs. Provision was also made in the resolution for keeping district presidents and the heads of local branches fully informed of all imporant actions. The routine work of the convention was closed when Howard P. Eells, of the Bucyrus Co., South Milwaukee, made a report on the investigation of the labor situation in certain cities.

New Officers Chosen.

The report of the nominating committee was also presented by Mr. Steedman. It involved the advancement of the two retiring vice presidents, the filling of the vacancy thus created by the selection of a member of the outgoing council, the retention of the treasurer and the selection of three new members of the administrative council. The recommendations of the nominating committee, which were adopted by a unanimous vote, were as follows:

President, M. H. Barker, of the American Tool & Machine Co., Boston.

First vice president, F. K. Copeland, of the Sullivan Machinery Co., Chicago.

Second vice president, O. B. Kinnard, of the Kinnard-Haines Co., Minneapolis.

Treasurer, William Lodge, of the Lodge & Shipley Machine Tool Co., Cincinnati.

For administrative council (term to expire in 1909), P. B. Kendig, of the Seneca Falls Mfg. Co., Seneca Falls, N. Y.; M. K. Bowman, of the James Reilly Repair & Supply Co., New York; J. Philip Bird, of the Hobbs Mfg. Co., Worcester, Mass.; and Cornelius Bermingham, of the Canadian Locomotive Co., Ltd., Kingstown, Ont.

Those members of the council whose terms do not expire until 1908, as they have served but half their terms, are W. M. Taylor, of the Chandler & Taylor Co., Indianapolis; J. H. Schwacke, of Wm. Sellers & Co., Inc., Philadelphia; Howard P. Eells, of the Bucyrus Co., South Milwaukee; and J. Kirby Jr., of the Dayton Mfg. Co., Dayton, O.

Mr. Barker, the new president, was one of the founders of the association and has been actively associated with the conduct of its affairs for nine years, all that time in an official capacity. He was presented to the convention in a laudatory speech by the retiring president and in a few well chosen remarks promised the organization his most earnest efforts and bespoke their most loyal support. Messrs. Covell and Steedman, both former presidents of the association, who had served as a committee to escort the newly elected president to the chair, performed a like office in the case of the other elects, and brief responses were made by Messrs. Copeland, Kinnard, Lodge, Bird and Bowman.

To the retiring president, W. D. Sayle, a rousing vote of thanks was tendered, and he in turn told of the pleasure he had derived from serving the association. The gratitude of the organization was also expressed to the Boston branch in recognition of its generous hospitality, and to the manufacturers in that section who had thrown open the doors of their plants to the convention visitors. A cablegram of greeting was sent to W. H. Pfahler in Europe and a telegram to W. B. Eagan in California. The explanation by Mr. Kirby of a plan suggested by the administrative council for an executive committee of three to meet monthly for the transaction of immediate business closed the session and the ninth annual convention of the association was a matter of history.

The Alumni Dinner.

It is the custom for those who have served the association in an official capacity in the past to gather with the present directorate in an alumni dinner on the evening immediately preceding the opening of the annual meeting. The occasion is always one of genial good fellowship and this year proved no exception. Seated about the table Wednesday evening were: J. W. Gardner, who acted as toastmaster; President W. D. Sayle, M. H. Barker, F. K. Copeland, William Lodge, H. N. Covell, Walter N. Pierce George W. Watts, Cornelius Bermingham, W. M. Taylor, Fred A. Geier, George F Steedman, F. H. Stillman, O. B. Kinnard, G. K. Garvin, O. P. Briggs, J. H. Schwacke, P. B. Kendig, A. H. Bullard, N. B. Payne, J. Kirby Jr., Howard P. Eells and Robert Wuest.

Brief talks were made by practically all attending, and a particularly interesting feature of the affair was the elaborate description by Mr. Geier of what he saw during a recent trip to Panama. The wonderful progress now being made on the canal work he declared only another magnificent illustration of what American enterprise can accomplish; to this the canal will prove a lasting monument. In equipment and management Mr. Geier said conditions along the canal route are equal to those existing in the best of our machine shops.

The work of Mr. Sayle as president of the association during the year was

referred to in glowing terms by Mr. Covell, and in appreciation of his services the alumni presented him with a handsome diamond scarf pin. The alumni also expressed their gratification at the able manner in which Secretary Wuest has carried out, not only his own duties, but those as well of the absent commissioner to whom a greeting was sent.

Administrative Council.

Following the adjournment of the convention, the administrative council, presided over for the first time by President Barker, held a session of several hours, during which a large amount of routine business was disposed of. Robert Wuest was reappointed acting commissioner, which means that the personnel of the home office will not be changed. The appointment of district committees was not brought up, owing to the proposed change in the constitution.

Those in Attendance.

W. D. Sayle, Cleveland Punch & Shear Wks. Co., Cleveland.
M. H. Barker, American Tool & Machine Co., Boston.
F. K. Copeland, Sullivan Machine Co., Chicago.
Wm. Lodge, Lodge & Shipley Mach. Tool Co., Cincinnati.
Robt. Wuest, Secretary N. M. T. A., Cincinnati.
O. B. Kinnard, Kinnard-Haines Co., Minneapolis.
C. E. Hildreth, Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.
C. Bermingham, Canadian Locomotive Co., Ltd., Kingston, Ontario.
G. K. Garvin, Garvin Machine Co., New York.
W. M. Taylor, Chandler & Taylor Co., Indianapolis.
J. H. Schwacke, Wm. Sellers & Co., Inc., Philadelphia.
Howard P. Eells, Bucyrus Co., So. Milwaukee.
J. Kirby Jr., Dayton Mfg. Co., Dayton, Ohio.
Julian V. Wright, Asst. Commissioner N. M. T. A., Cincinnati.
J. H. Cone, Asst. Secy. N. M. T. A., Cincinnati.
N. W. Dingwall, Auditor N. M. T. A., Cincinnati.
H. N. Covell, Lidgerwood Mfg. Co., Brooklyn.
J. W. Gardner, Gardner Governor Co., Quincy, Ill.
G. F. Steedman, Curtis & Co. Mfg. Co., St. Louis.
P. B. Kendig, Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Fred F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.
Edward E. Bartlett, Greenwood Arbor Press, Boston.
Alfred E. Cox, Atlantic Works, East Boston.
E. P. Robinson, Atlantic Works, East Boston.
Duncan D. Russell, Jas. G. Russell Boiler Works, South Boston.
George F. Lawley, Geo. F. Lawley & Sons Corporation, South Boston.
Thomas Hibbard, Geo. F. Lawley & Sons Corporation, South Boston.
A. J. Lovejoy, Becker-Brainard Mfg. Co., Hyde Park.
John G. Morrison, Mead-Morrison Mfg. Co., Cambridge.
F. A. Fisher, Cape Ann Anchor Works, Gloucester.
Eugene Childs, Tremont Mfg. Co., Boston.
Frank E. White, G. W. & F. Smith Iron Co., Boston.
Winslow Blanchard, Blanchard Machine Co., Cambridge.
Henry H. Lynch, Hodge Boiler Works, East Boston.
H. A. Stebbins, Sub. Target Gun Co., Boston.
H. T. Illingsworth, Boston Mach. Wks. Co., Lynn, Mass.
J. E. Leavitt, Bresnahan Shoe Mach. Co., Lynn, Mass.
J. A. Murray, Murray & Tregurtha Co., South Boston.
Geo. V. Rogers, Holmes & Blanchard Co., Boston.
D. F. S. Clark, Secy. Boston Branch N. M. T. A., Boston.
Paul Blatchford, Secy. Chicago Branch N. M. T. A., Chicago.
J. F. Hem, Secy. St. Louis Branch N. M. T. A., St. Louis.
H. R. Luther, Barbour-Stockwell Co., Cambridge, Mass.
J. H. Webster, Variety Iron & Steel Wks. Co., Cleveland.
E. C. Spear, Cheney Bigelow Wire Wks., Springfield, Mass.
A. J. Tucker, Hampden Brass Co., Springfield, Mass.
A. E. Rowland, Rowland Mach. Co., New Haven, Conn.
Harris Tabor, Tabor Mfg. Co., Philadelphia.
D. H. McPherson, Secy. Metal Mfg. Association, Philadelphia.
E. F. DuBrul, Miller, DuBrul & Peters Mfg. Co., Cincinnati.
Wm. M. Bellman, Shaw-Kendall Co., Toledo.
F. C. Caldwell, H. W. Caldwell & Son Co., Chicago.
C. M. Foster, National Supply Co., Toledo.
C. G. Cooke, Geo. M. Griswold Machine Co., New Haven, Conn.
F. H. Stillman, Watson & Stillman, New York.
Julius G. Day, Whitlock Ptg. Press Co., New Haven.
Geo. T. Bliss, Erie City Iron Works, Erie City, Pa.
Geo. H. Thompkins, Asst. Secy., Chicago.
Frederick R. Boocock, American Anti-Boycott Association, New York.
J. G. Blount, G. Blount & Co., Everett, Mass.
John H. Barr, Smith Premier Typewriter Co., Syracuse, N. Y.
Philip Frankel, Secy. N. M. T. A., Cleveland.
E. F. Chamberlain, Scranton Forging Co., Scranton, Pa.
F. D. Wanning, Birmingham Iron Foundry, Derby, Conn.
W. E. Burnham, Pacific Iron Works, Inc., Bridgeport, Conn.
A. H. Bullard, Bullard Mach. Tool Co., Bridgeport, Conn.
Nathan Beers Payne, Manning, Maxwell & Moore, New York.
A. J. Allen, Secy. Indianapolis Branch, Indianapolis.
W. A. Taylor, Mallory & Taylor Iron Works, Macon, Ga.
Wm. Kehoe, Wm. Kehoe & Son, Savannah, Ga.
F. H. Smith, F. H. Smith & Co., Chicago.
Albert L. Pope, Pope Motor Car Co., Hartford, Conn.
George Pope, Treas. Pope Motor Car Co.
Chas. E. Walker, Pope Mfg. Co., Hartford, Conn.
H. H. Latham, Latham Machine Co., Chicago.
E. E. Hanna, Hanna Engineering Works, Chicago.
Herbert H. Rice, Pope Motor Car Co., Indianapolis.
Edwards Hinsman, Pope Mfg. Co., Westfield, Mass.
George D. Kirkham, Harris Automatic Press Co., Niles, O.
Walter H. Phillips, Boston.
L. Moilthrop, New Haven Mfg. Co., New Haven, Conn.
Chas. A. Haney, Sloan & Chace Mfg. Co., Ltd., Newark, N. J.
R. H. Brown, R. H. Brown Co., New Haven.
E. W. Baker, pattern model maker, Cambridgeport, Mass.
F. M. Cresson, Geo. V. Cresson Co., Philadelphia.
D. Macauley, 167 Oliver St., Boston.
Wm. S. Hallowell, Harrison Safety Boiler Works, Philadelphia.
Wm. H. Roberts, S. L. Allen & Co., Philadelphia.
Davis A. Ralston, Chaplin-Fulton Mfg. Co., Pittsburg.
J. W. Moore, Moore, Wyman Elevator & Machine Works, Boston.
Geo. W. Jackson, Springfield Mfg. Co.
W. C. Blount, Blount & Lovell, Boston.
C. Lester Sherman Jr., John S. Gammer Co., Philadelphia.
D. G. Langlands, J. H. Roberts & Co., Boston.
Wm. C. Chaplin, Chaplin Fulton Mfg. Co., Pittsburg.
Chas. T. Bliss, Farrell Foundry Machine Co.
Albert A. Baker, Farrell Foundry Machine Co., Ansonia, Conn.
P. G. March, Cincinnati Shaper Co., Cincinnati.
J. Phillip Bird, Hobbs Mfg. Co., Worcester.
W. H. Hodges, Thomas Elec. Welding Co., Lynn, Mass.
A. W. Beaman, Stockbridge Machine Co., Worcester.
Walter A. Medart, Medart Pat. Pulley Co., St. Louis.
F. W. Boye Jr., Schumacher & Boye, Cincinnati.
John Nelson, *The Iron Age*, Worcester.
A. H. Folger, Lockwood Mfg. Co., East Boston.
James Eastwood, Benj. Eastwood Co., Paterson, N. J.
John S. Oram, Barrel Machinery, Cleveland.
C. H. Norton, Norton Grinding Co., Worcester.
James A. Howarth, Hoggson & Pettis Mfg. Co., New Haven.
John E. Lynch, Hodge Boiler Wks., Boston.
Wm. J. Perry, Wm. J. Perry Co., Boston.
R. D. Reed, H. B. Smith Co., Westfield, Mass.
A. F. Bassett, Springfield Branch N. M. T. A., Springfield, Mass.
E. F. Braren, Weller Mfg. Co.
S. D. W. Cleveland, Syracuse Metal Trades Association.
H. B. Slate, Dwight Slate Mch. Co., Hartford.
C. L. Cummings, Cummings Mch. Co., New York.
Frank Burgess, Boston Gear Wks., Boston.
Geo. W. Watts, Canadian Gen. Elec. Co., Toronto, Ont.
L. O. Bevin, Rider-Erricson Engine Co., New York.
Christopher Cunningham, New York.
R. G. Henry, Henry & Wright Mfg. Co., Hartford.
D. W. Wright, Henry & Wright Mfg. Co., Hartford.
E. H. Warner, Fitchburg Machine Works, Fitchburg, Mass.
A. I. Jacobs, Jacobs Mfg. Co., Hartford.
E. F. DuBrul, Bickford Drill & Tool Co., Cincinnati.
E. C. Henn, National Acme Mfg. Co., Cleveland.
Walter M. Bacon, American Tool & Machine Co., Botson.
A. C. Fischer, Secy. Toledo Branch N. M. T. A.
Theodore Waters, Watson-Stillman Co., New York.
M. K. Bowman, Jas. Reilly Supply & Repair Co., New York.
B. S. Stephenson, IRON TRADE REVIEW, New York.
George Smart, editor IRON TRADE REVIEW, Cleveland.
Jay P. Dawley, President Employers' Association, Cleveland.
W. J. Dawley, Cleveland.
Alonzo B. See, A. B. See Elec. Elevator Co., New York.
J. W. Van Cleave, President N. A. M., St. Louis.
Josiah H. Long, J. H. Long Machine Co., Boston.
Hon. J. F. Fitzgerald, mayor of Boston.
Joseph Reid, Joseph Reid Gas Engine Co., Boston.
Henry J. Hind, Toledo Mach. & Tool Co., Toledo.
Henry C. Hunter, Secy. New York and New Jersey Branch, New York.
F. A. Geier, Cincinnati Milling Machine Co., Cincinnati.
F. Fosdick, Fitchburg Steam Engine Co., Fitchburg, Mass.
G. M. Edgett, Gilbert M. Edgett & Co., South Brooklyn.
O. P. Briggs, President National Foundrymen's Association, Minneapolis.
Eugene Fairchild, Wallace Barnes Co., Bristol, Conn.
Albert E. Newton, Prentice Bros. Co., Worcester.
J. C. Hobert, Triumph Elec. Co., Cincinnati.
S. P. Egan, J. A. Fay & Egan Co., Cincinnati.
Fred S. Wetherby, *American Machinist*, New York
Mason Britton, *American Machinist*, New York.
John A. Hill, Hill Pub. Co., New York.
J. M. Manley, Secy. Cincinnati Branch, Cincinnati.
Geo. F. Brooks, Harrington & Richardson Arms Co., Worcester.
C. W. Marston, J. M. Marston & Co., Boston.
Donald Talloch, Worcester Branch, Worcester.
C. L. Ackerson, Syracuse Aluminum & Bronze Co., Syracuse, N. Y.
H. F. Arnold, Amer. Tool & Mach. Co., Boston.
R. C. Payson, Portland Co., Portland, Me.
H. D. Barker, Frank Mach. Co., Buffalo.
C. S. Bonsall, Buckeye Engine Co., Salem, O.
E. M. Cross, Berlin, N. H.
Geo. V. Milliken, Pittsburg Mfg. Co., Pittsburg.
John E. Gorss, Buffalo Branch N. M. T. A., Buffalo.
H. S. Madden, Howard Iron Wks., Buffalo.
A. L. Bell, Ridgway Dynamo & Engine Co., Ridgway, Pa.
P. B. Gale, Hartford Mach. Schew. Co., Hartford.
Henry Ritter, Lunkenheimer Co., Cincinnati.
H. E. Barr, H. G. Barr, Worcester.
C. E. Whitney, C. E. Whitney Mfg. Co., Hartford
W. W. Totman, Whitney Mfg. Co., Hartford.
Chas. Hitch Jr., American Tool & Machine Co., Boston.
Wm. Scott, Roe-Stephens Mfg. Co., Detroit.
A. M. Powell, Woodward & Powell Planer Co., Worcester.
W. L. Pierce, Lidgerwood Mfg. Co., Brooklyn.
H. B. McDonald, Simonds Mfg. Co., Fitchburg, Mass.
H. K. Simonds, Simonds Mfg. Co., Fitchburg, Mass.

THE ART OF CUTTING METALS[1]

(Continued from last week.)

By Fred W. Taylor.

EFFECT OF FEED AND DEPTH OF CUT ON CUTTING SPEED.

Effect of Varying the Thickness of the Feed and Depth of Cut upon the Cutting Speed When Standard Round Nosed Tools are Used in Cutting Steel.

In Part I[2] of this paper we have called attention to the fact that the difficulty of obtaining mathematical expressions or formulae which accurately correspond to the data obtained in our experiments has been almost as great as that of making the experiments themselves, and we may say that through a very considerable portion of the past 26 years we have worked at the mathematical side of this problem. The writer believes that he is well within the limit in stating that during this time we have tried and developed hundreds of formulae in our endeavor to give accurate mathematical expression to the facts. It may, therefore, be a matter of interest to briefly indicate the logic back of the type of formula finally adopted.

It will be noted by referring to Fig. 18 that all of our standard tools are similar in their general outline. They consist of an arc of a circle, whose radius is r, at their extreme noses, supplemented by another arc of a circle giving the remainder of the cutting edge of the tool; and in the general similarity existing between these tools it will be observed that the radius of the curve at the extreme nose of the tool may be said to be the controlling factor or element.

We have several times pointed out the fact that a curved cutting edge in a tool cuts a shaving varying in its thickness at all points, and it is evident that the rate at which this shaving grows thicker as the cutting edge recedes from the extreme point of the nose bears a certain relation to the radius r, above referred to. This will be seen by referring to the enlarged curves of our standard tools, Fig. 34[3]. Generally speaking, the shaving grows thicker more rapidly the smaller the radius r of the curve, and since the thicker the shaving, the slower becomes the cutting speed, there is thus seen a general relation between this radius r and the cutting speed.

This relation is expressed in the following general formula in which

V = standard cutting speed in feet per minute.

F = thickness of the feed in inches, *i. e.*, advance of the tool in inches for each revolution of the forging;

D = depth of cut in inches, *i. e.*, half of the amount by which the forging is reduced in diameter by the cut;

r = radius of nose of tool = one-half width of shank of tool in inches—5-32 inch, shown in Fig. 18, and in which the value of the constant depends both upon the hardness of the material to be cut and on the quality of the tool, in such a manner that the harder the material, the smaller this constant, and the better the tool the greater this constant:

$$V = \frac{\text{Constant}\left(1-\frac{8}{7(32r)}\right)^{*}}{F^{\frac{2}{5}+\frac{2.12}{5+32r}}\left(\frac{48}{32r}D\right)^{\frac{1}{15}+0.06\sqrt{32r}+\frac{0.8(32r)}{6(32r)+48D}}} \qquad [A]$$

The reasons for the particular form of this general formula are so many and complexly interwoven that it would require pages of description to set them forth; and inasmuch as the whole formula is empirical our reasons are, after all, of minor interest.

We would, however, call special attention to the fact that the particular formulae developed from our general formula fit in quite a remarkable way the actual data obtained in our experiments. This will be noted by examining the curves of the diagrams representing each formula in their relation to the spots or points on these diagrams representing the facts. Moreover, inasmuch as these experiments were made by different experimenters and at different times and upon different pieces of metal with different sets of tools, it adds very greatly to the probability of the general accuracy of our work that it has been possible to find a single general formula which fits so closely to all these practical results. It is, perhaps, on the whole, the best possible evidence that the experiments have been accurately and conscientiously made, and proves beyond a doubt that general laws exist covering this whole field.

For the various tools up to and including 1¼ inch to which we can apply this formula with reasonable accuracy, formula [A], paragraph above, becomes:

For ¼-in. tool, for which $r = \frac{8}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.87}{F^{0.665}\left[\frac{48}{3}D\right]^{0.2373+\frac{2.4}{18+48D}}} \qquad [B]$$

For ⅝-in. tool, for which $r = \frac{20}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.964}{F^{0.612}\left[\frac{48}{5}D\right]^{0.2675+\frac{4}{30+48D}}} \qquad [C]$$

For ¾-in. tool, for which $r = \frac{24}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.977}{F^{0.5767}\left[\frac{48}{7}D\right]^{0.2921+\frac{5.6}{42+48D}}} \qquad [D]$$

For ⅞-in. tool for which $r = \frac{28}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.986}{F^{0.5514}\left[\frac{48}{9}D\right]^{0.3133+\frac{7.2}{54+48D}}} \qquad [E]$$

For 1-in. tool, for which $r = \frac{32}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.991}{F^{0.5325}\left[\frac{48}{11}D\right]^{0.3329+\frac{8.8}{66+48D}}} \qquad [F]$$

For 1¼-in. tool, for which $r = \frac{40}{32}$ in.,

$$V = \frac{\text{Constant} \times 0.995}{F^{0.506}\left[\frac{48}{15}D\right]^{0.3057+\frac{12}{0+48D}}} \qquad [G]$$

We will now proceed to describe some of the more prominent sets of experiments made by us with various sized tools, and which form the basis for the above given formulae.

Experiments with ⅞ inch standard round nosed tool. (Shown in Fig. 20.[4]) In table 101 will be found a sample summary sheet of one of our series of experiments made with our standard ⅞ inch tool. In this table are recorded the important data connected with each experiment made with each individual tool. In this series of experiments we were, on the whole, successful in having a combination of uniform quality of metal to cut, unusual uniformity in the cutting

[1] Presidential Address, A. S. M. E., 1906.
[2] Iron Trade Review, Dec. 13, 1906.
[3] Iron Trade Review, Jan. 24, 1907.

*The expression $\left[1-\frac{8}{7(32r)}\right]$ in the numerator of the general formula [A] was arrived at by a comparison of the cutting speeds obtained by standardizing various sized tools on the same forging preparatory to using them in any one of the separate series of experiments subsequently made.

[4] Iron Trade Review, Jan. 24, 1907.

TABLE 101.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

This represents one of the most successful series of experiments made. Tool used, standard 7/8-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. For logarithmic plot and summary of table of these experiments see Figs. 102, 103, and 104. Date and place of experiments, Bethlehem Steel Co., South Bethlehem, Pa., 1900. Chemical composition of tool: Tungsten, 8.50; chromium, 2.00; carbon, 1.85; manganese, 0.15; silicon, 0.15. Chemical composition of forging: Carbon, 0.33; manganese, 0.63; phosphorus, 0.31; sulphur, 0.172. Physical properties of forging: Tensile strength, 67,365 pounds; elastic limit, 39,545 pounds; extension, 25.25 per cent; contraction, 45.565 per cent. Meaning of symbols: G = good; F = fair; BR = began to ruin; R = ruined.

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	1" 16 DEPTH OF CUT				
1" 16	65$_a$	G$_1$	84.6	20.0	G
	66$_a$	G$_2$	91.7	20.0	G
	67$_a$	G$_3$	100.2	20.0	G
	68$_a$	G$_4$	105.0	5.0	R
	69$_a$	F$_4$	103.6	5.5	R
	70$_a$	F$_3$	96.0	8.5	R
	71$_a$	F$_2$	103.0	20.0	F
	Conclusion		103	20	6
1" 8	72$_a$	G$_1$	61.1	20.0	G
	73$_a$	G$_2$	66.0	12.5	R
	74$_a$	F$_3$	65.0	8.5	R
	75$_a$	F$_2$	68.5	20.0	G
	Conclusion		65.5	20	6
3" 16	84$_a$	G$_1$	57.8	4.5	R
	85$_a$	G$_2$	55.9	5.0	R
	86$_a$	K$_3$	43.1	12.0	R
	87$_a$	K$_2$	43.4	20.0	G
	88$_a$	K$_1$	46.3	20.0	G
	89$_a$	N$_1$	46.5	6.0	R
	90$_a$	N$_2$	47.1	20.0	G
	91$_a$	N$_3$	49.9	10.0	R
	Conclusion		47.1	20	6

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	1" 8 DEPTH OF CUT				
1" 16	58$_a$	F$_4$	63.6	20.0	G
	59$_a$	G$_1$	66.6	20.0	G
	60$_a$	F$_1$	73.4	18.0	R
	61$_a$	F$_3$	nick in tool tested		
	62$_a$	F$_4$	71.7	20.0	F
	Conclusion		72	20	6
1" 8	52$_a$	K$_4$	61.0	5.0	R
	53$_a$	E$_4$	55.7	7.0	R
	54$_a$	E$_3$	47.9	10.0	R
	55$_a$	F$_1$	44.2	20.0	G
	56$_a$	F$_2$	47.3	20.0	F
	57$_a$	F$_3$	47.6	8.0	R
	75$_a'$	G$_4$	48.8	20.0	G
	76$_a$	G$_3$	52.4	10.5	R
	77$_a$	G$_2$	50.3	9.5	R
	Conclusion		48.8	20	6
3" 16	48$_a$	F$_4$	45.6	6.0	R
	49$_a$	F$_{10}$	38.5	20.0	G
	50$_a$	G$_1$	43.2	11.0	R
	51$_a$	G$_2$	42.8	15.0	R
	Conclusion		40	20	6

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	3" 16 DEPTH OF CUT				
1" 16	1$_a$	K$_4$	39.6	20.0	G
	2$_a$	K$_3$	41.1	14.0	R
	3$_a$	D$_2$	42.7	20.0	G
	4$_a$	D$_3$	44.3	13.5	R
	5$_a$	D$_2$	50.3	9.0	R
	6$_a$	D$_1$	48.0	20.0	G
	Previously Standardized at 60 feet				
1" 8	7$_a$	D$_2$	29.6	20.0	F
	8$_a$	E$_3$	29.9	20.0	G
	9$_a$	E$_2$	34.9	20.0	G
	10$_a$	E$_1$	38.2	11.0	R
	11$_a$	E$_2$	38.5	11.5	R
	12$_a$	RF$_{10}$	47.0	13.5	R
	Conclusion		35	20	6
3" 16	92$_a$	K$_4$	39.7	20.0	G
	93$_a$	K$_3$	41.2	20.0	G
	94$_a$	K$_2$	42.2	20.0	G
	95$_a$	K$_1$	43.4	20.0	G
	96$_a$	F$_1$	44.6	20.0	G
	97$_a$	F$_2$	46.0	20.0	F
	98$_a$	F$_3$	47.0	20.0	F
	Conclusion		44	20	6

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	1" 4 DEPTH OF CUT				
1" 16	19$_a$	K$_4$	43.4	20.0	G
	20$_a$	D$_3$	49.9	20.0	G
	21$_a$	E$_3$	54.0	12.5	R
	22$_a$	E$_2$	48.3	12.0	R
	23$_a$	E$_1$	51.6	20.0	F
	Conclusion		51.6	20	6
1" 8	24$_a$	E$_3$	38.5	15.5	R
	25$_a$	E$_{10}$	37.6	20.0	F
	26$_a$	K$_3$	38.4	15.5	R
	78$_a$	I$_1$	39.9	13.5	R
	Conclusion		37.6	20	6
3" 16	13$_a$	K$_3$	broke in 3 min.		
	14$_a$	D$_3$	28.3	20.0	F
	15$_a$	E$_3$	30.4	20.0	F
	16$_a$	D$_3$	32.4	12.0	R
	17$_a$	E$_3$	30.8	20.0	G
	18$_a$	D$_4$	33.0	7.0	G
	Conclusion		30.8	20	6

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	3" 8 DEPTH OF CUT				
1" 16	30$_a$	D$_3$	29.0	20.0	G
	40$_a$	E$_2$	33.9	10.0	R
	41$_a$	E$_{10}$	33.9	20.0	G
	42$_a$	F$_1$	35.8	19.75	R
	Conclusion		34.6	20	6
1" 8	43$_a$	D$_3$	24.6	20.0	G
	44$_a$	F$_3$	broke in 12.5 min.		
	45$_a$	F$_2$	29.1	9.0	R
	46$_a$	E$_{10}$	26.4	10.5	R
	47$_a$	F$_3$	25.8	14.0	R
	Conclusion		24.8	20	6

FEED	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
	1" 2 DEPTH OF CUT				
1" 16	79$_a$	K$_{10}$	tool broke in 1 min.		
	80$_a$	K$_4$	39.4	20.0	G
	81$_a$	I$_2$	45.0	11.0	R
	82$_a$	G$_3$	40.5	15.5	R
	83$_a$	G$_4$	43.3	20.0	G
	Conclusion		43.3	20	6

tools, and also great care on the part of the experimenter; and it is seldom that all of these favorable conditions are found in any one set of experiments. This table may, therefore, be said to represent one of the best series of expriments made by us.

The conclusions noted in this table will be found in the summary, table 102, and alongside of them are entered also the cutting speeds as figured by the formula given below. A comparison of the cutting speeds given by the formula [E], with the proper constant covering this series of experiments as given in formula [H], and those actually obtained in experiments will illustrate the degree of accuracy attained both in the experimental and mathematical work. Our conclusions are again plotted as points or spots upon ordinary cross-section paper in the diagram, Fig. 103, and again in a logarithmic lay-out in Fig. 104.

$$V = \frac{13.4}{F^{0.5514}\left(\frac{48}{9}D\right)^{0.3133} + \frac{7.2}{54+48D}} \qquad [H]$$

The constant to be substituted in this formulae for the best speed tool, No. 1 (medium steel), as explained in paragraph below, is 21.46.

The curves plotted in Figs. 103 and 104 are a graphical expression of this formula. This set of experiments was made with tools of the chemical composition given in the printed matter above table 101. Further details regarding this tool and its cutting speed with relation to other high speed tools will be found in table 118 to be presented later, opposite tool No. 27.

It will be noted that tools differing in their chemical composition were used for making the several sets of experiments described by us. In order to render the formula useful for the best modern high speed tools we therefore give, close to each formula, a constant which should be substituted in the formula if the best modern high speed tool has been used in making the particular experiment (we here refer to tool on page 464, IRON TRADE REVIEW, March 21, 1907, which will

TABLE 102.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Expernments made with standard 7/8 x 1 1/4-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Experiments plotted on logarithmic paper in Fig. 103 and on cross section paper in Fig. 104. Place and date of experiments, Bethlehem Steel Co., South Bethlehem, Pa., 1900. For detail runs of the individual tools see Fig. 101.

FEED IN INCHES	DEPTH OF CUT IN INCHES	CUTTING SPEED IN FEET FROM EXPERIMENTS	CUTTING SPEED, IN FEET, BY THE FORMULA $V = \frac{13.4}{F^{0.5514}\left(\frac{48}{9}D\right)^{0.3133} + \frac{7.2}{54+48D}}$
1/16	1/16	103.0	99.7
	1/8	72.0	73.6
	3/16	60.0	61.9
	1/4	51.6	54.8
	3/8	49.0	46.4
	1/2	43.3	41.6
1/8	1/16	65.5	68.1
	1/8	48.8	50.3
	3/16	45.0	42.2
	1/4	37.6	37.4
	3/8	34.6	31.7
3/16	1/16	47.1	54.5
	1/8	40.0	41.2
	3/16	35.0	33.7
	1/4	30.8	29.8
	3/8	21.8	25.3

be known as tool No. 1; and also if the steel cut by this tool had medium steel of the following chemical and physical properties:

Carbon	0.34
Manganese	0.54
Silicon	1.76
Phosphorus	0.037
Sulphur	0.026
Tensile Strength	70280 lbs.
Elastic Limit	34630 lbs.
Percentage of stretch	29.0
Percentage of contraction	44.34

Experiments With Standard, 1 Inch Tool.

In table 105 are recorded the results of experiments similar to those just described, with ⅞ inch tools, and in Fig. 106 is given the logarithmic lay-out of the results of this experiment. Formula [J], below, which is the same as formula [F], with the proper constant, gives a mathematical expression corresponding to the results of this experiment.

$$V = \frac{14.7}{F^{0.5325}\left(\frac{48}{11}D\right)^{0.3323 + \frac{8.8}{67 + 48D}}} \quad [J]$$

The constant to be substituted in this formula for the best high speed tool No. 1, as explained, is 21.56.

Experiment With Standard ½ Inch Tool, as Shown in Folder 5, Fig.

In table 107 are recorded the results of experiments similar to those with ⅞ inch tools, and in Fig. 108 is given the logarithmic lay-out of the results of these experiments. Formula [K], below, which is the same as formula [B], with the proper constant, gives a mathematical expression corresponding to the results of these experiments.

$$V = \frac{11.9}{F^{0.665}\left(\frac{48}{3}D\right)^{0.2373 + \frac{2.4}{18 + 48D}}} \quad [K]$$

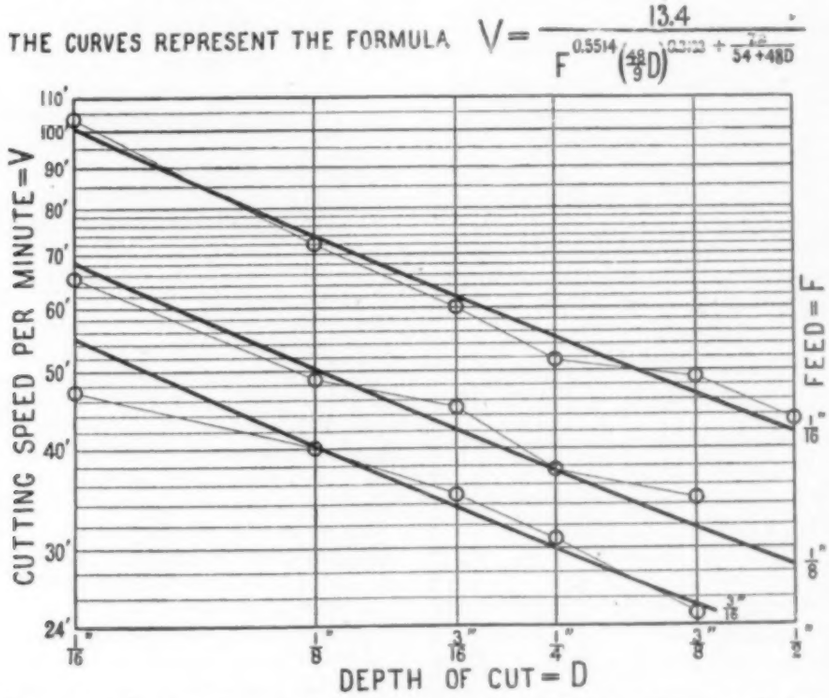


FIG. 104.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard ⅞ x 1¼-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Experiments plotted on cross section paper in Fig. 103.

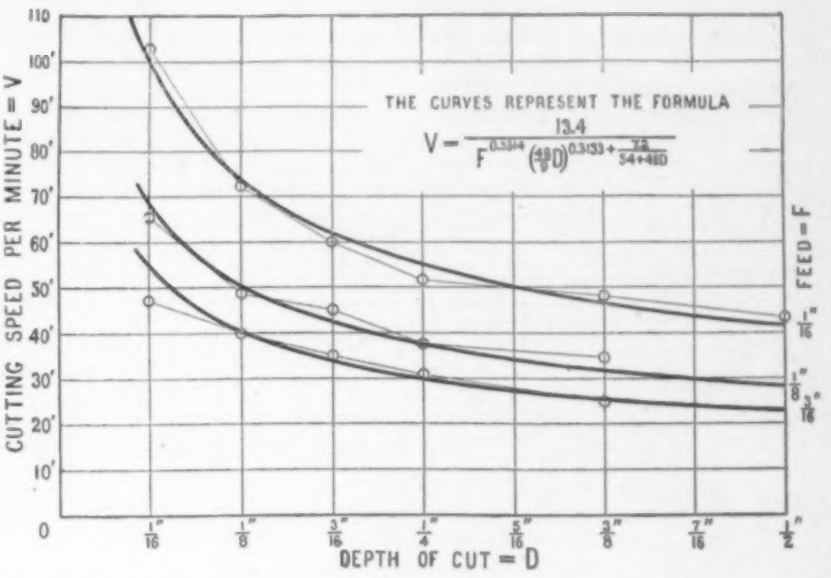


FIG. 103.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard ⅞ x 1¼-inch round nose roughing tool; clearance angle, 6 degrees; back slope 8 degrees; side slope, 14 degrees. For experiments plotted on logarithmic paper see Fig. 104.

The constant to be substituted in this formula for the best high speed tool, No. 1, is 19.

Similar experiments were made with our standard ⅝ and ¾-inch tools, covering, however, not so wide a range of feeds and depths of cut, and the following formulae represent with fair accuracy these tools when using the best high speed tool, No. 1, on medium steel.

For ⅝-inch standard tool, use formula [C], except that 20.77 will be substituted for the numerator.

For ¾-inch standard tool, use formula [D], except that 21.26 will be substituted for the numerator.

For 1¼-inch standard tool, use formula [G], except that 21.66 will be substituted for the numerator.

The Effect of Varying the Thickness of Feed and Depth of Cut Upon Cutting Speed When Our Standard Round Nosed Tools are Used in Cutting Cast Iron.

As heretofore explained, the difficulty in making a complete and consistent series of experiments upon cast iron is very great owing to the fact that masses of cast iron of uniform hardness and sufficiently large to make the many tool runs required can but rarely be made. After many trials we finally obtained three test pieces of cast iron, cast with a hollow core so as to give a comparatively thin section, the metal of which was proved in our experiments to be remarkably uniform. These test pieces, however, contained only enough metal to make thorough experiments with a single sized tool.

As the law for cutting cast iron is

only slightly different in character from that for cutting steel, we therefore assume that a similar relation exists between different sized tools in cutting cast iron and in cutting steel. The following formulae are based upon this assumption and apply to tool No. 1 on medium cast iron.

For ¼- inch tool

$$V = \frac{68.3}{\left[20\,F\right]^{0.6383 - \frac{0.3}{1 + 100F}} \left[\frac{32}{3}D\right]^{0.1743 + \frac{0.27}{3 + 32D}}}$$

For ½-inch tool

$$V = \frac{65.4}{\left[20\,F\right]^{0.5863 - \frac{0.3}{1 + 100F}} \left[\frac{32}{5}D\right]^{0.2182 + \frac{0.27}{3 + 32D}}}$$

For ¾-inch tool

$$V = \frac{62.0}{\left[20\,F\right]^{0.55 - \frac{0.3}{1 + 100F}} \left[\frac{32}{7}D\right]^{0.25 + \frac{0.27}{3 + 32D}}}$$

For ⅞-inch tool

$$V = \frac{59.0}{\left[20\,F\right]^{0.5248 - \frac{0.3}{1 + 100F}} \left[\frac{32}{9}D\right]^{0.2757 + \frac{0.27}{3 + 32D}}}$$

For 1-inch tool

$$V = \frac{56.9}{\left(20\,F\right)^{0.5058 - \frac{0.3}{1 + 100F}} \left(\frac{32}{11}D\right)^{0.2978 + \frac{0.27}{3 + 32D}}}$$

For 1¼-inch tool

$$V = \frac{54.1}{\left(20\,F\right)^{0.4793 - \frac{0.3}{1 + 100F}} \left(\frac{32}{15}D\right)^{0.335 + \frac{0.27}{3 + 32D}}}$$

Experiment With a ¾ Inch Standard Round Nosed Tool.

Tools of the following chemical composition were used in this experiment:

Tungsten	14.71 per cent
Chromium	2.90 per cent
Carbon	0.70 per cent
Manganese	0.12 per cent
Silicon	0.196 per cent
Phosphorus	0.017 per cent
Sulphur	0.010 per cent

In table 109 we give the detail tool runs of one of our best sets of experiments made in cutting rather hard cast iron. The details of these experiments are given in order that a fair estimate may be formed as to the accuracy of the work. In table 110, column 1, is given a summary of the results obtained in this series of experiments, and in adjoining columns will be found the corresponding figures as represented by the formula which we have developed and which expresses what we believe to be laws governing the effect of feed and depth of cut upon cutting speed in cutting this quality of cast iron.

In Fig. 111 are given two logarithmic plots of the same experiments. In one of these plots the feeds are given at the bottom and the depth of cut at the side, while in the other the depths of cut are given at the bottom and the feeds at the side. A study of these two diagrams side by side will indicate the effect both of varying the thickness of shaving and the depth of the cut, considered one with relation to the other.

In Fig. 112 we also show the same experiments plotted on ordinary cross-section paper. This again furnishes an illustration of the greater simplicity and adaptability of the logarithmic lay-out and particularly its advantage in developing formulae which shall express the laws.

Unfortunately, the silicon was the only element accurately determined for the various bars of cast iron experimented upon by us at this time. The silicon of the bar in question was 1.10 per cent. The lines drawn upon the various diagrams just referred to represent the following formula:

$$V = \frac{54}{\left(20\,F\right)^{0.55 - \frac{0.3}{1 + 100F}} \left(\frac{32}{7}D\right)^{0.25 + \frac{0.27}{3 + 32D}}} \quad [L]$$

It will be noted that the experiments above described upon the cast iron test piece containing 1.10 per cent of silicon include the following feeds:

0.0156 inch, 0.0316 inch, 0,0632 inch, 0.0127 inch, and the following depths of cut:

3-32 inch, 3-16 inch, and ⅜ inch.

This casting did not contain a sufficient quantity of metal to make tests with the combinations of depth of cut and feed which are needed to more fully establish the law sought for. Therefore, two additional castings were made and experimented upon. It was our aim to have the same quality of cast iron in these castings as in the one containing 1.10 per cent of silicon. In this, however, we were not successful, as both of the other castings were considerably softer. One of these supplementary castings contained 1.12 per cent silicon, while the other contained 1.20 per cent silicon, and they varied considerably in hardness, as will be seen from their constants in the formula. On the test casting containing 1.12 per cent of silicon, experiments were made with cuts ⅝ inch in depth and

TABLE 105.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard 1 x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees; for experiments plotted on logarithmic paper, see Fig. 106.

DEPTH OF CUT IN INCHES	FEED IN INCHES	CUTTING SPEED IN FEET FROM EXPERIMENTS	CUTTING SPEED, IN FEET, BY THE FORMULA $V = \frac{14.7}{F^{0.5325}\left(\frac{48}{11}D\right)^{0.3323 + \frac{8.8}{66 + 48D}}}$
1/8	0.0215	151	149.5
	0.0325	122	120.0
	0.0460	93	99.7
	0.0630	82	84.3
	0.0925	69	68.7
	0.1280	57½	57.8
3/16	0.0212	116	125.3
	0.0630	70	70.1
27/64	0.0210	86	88.3
	0.0325	67	69.9
	0.0450	59	58.8
	0.0645	49	48.6

using feeds from 0.0156 to 0.0632 inch; and a sufficient number of experiments were made also with a depth of cut of 3-16 inch to properly tie together these experiments and the former experiments made on the test piece containing 1.10 per cent of silicon; *i. e.*, to accurately determine the relative hardness of the two castings.

In table 110, column 2, is given a summary of the results obtained in this experiment and also alongside, the results as figured by formula [L], for the experiments on the 1.10 per cent silicon bar, except that the constant instead of being 54 for this quality of cast iron is 66.7.

In Fig. 113 is also given a logarithmic lay-out of these experiments.

A third series of experiments was made upon the cast iron test piece containing 1.20 per cent of silicon. In this case most of the experiments were made with a ⅜ inch depth of cut. However, a 3-16 inch depth of cut was also used for tying these various sets of experiments together. A summary of the results of these experiments will be found in table 110, column 3, with the results as figured by the formula in adjacent columns. The same formula [L] was used for this set of experiments as for the experiments with a 1.10 per cent silicon test bar, except that the constant in this case was 70.9 instead of 54, showing that this test piece was materially softer than the other.

By comparing the lines which represent each formula upon the three diagrams with the points or spots which indicate the actual cutting speeds obtained, it will be noted that, on the whole, the same formula fits very closely to the three sets of experiments, and attention is again called to the fact that while these experiments were made at different times and with different sets of tools, yet after several years we have been able to find a single mathematical expression which represents with a very considerable degree of accuracy the results obtained in all of these experiments.

This fact, in our judgment, adds very greatly to the value of the work, because if the experimental results had been such that no mathematical expression could be found which fitted them with accuracy, either one of two conclusions must be drawn: namely, that the conditions under which the experiments were made were such that accurate results could not be obtained, or else that the nature of the work in this whole field of experiments was such as to make it impossible to obtain truly scientific results. It is, therefore, a matter of the greatest gratification to us that it has been possible to represent these various experiments by exactly the same formula, excepting that the constants 54, 66.7 and 70.9 were required to represent

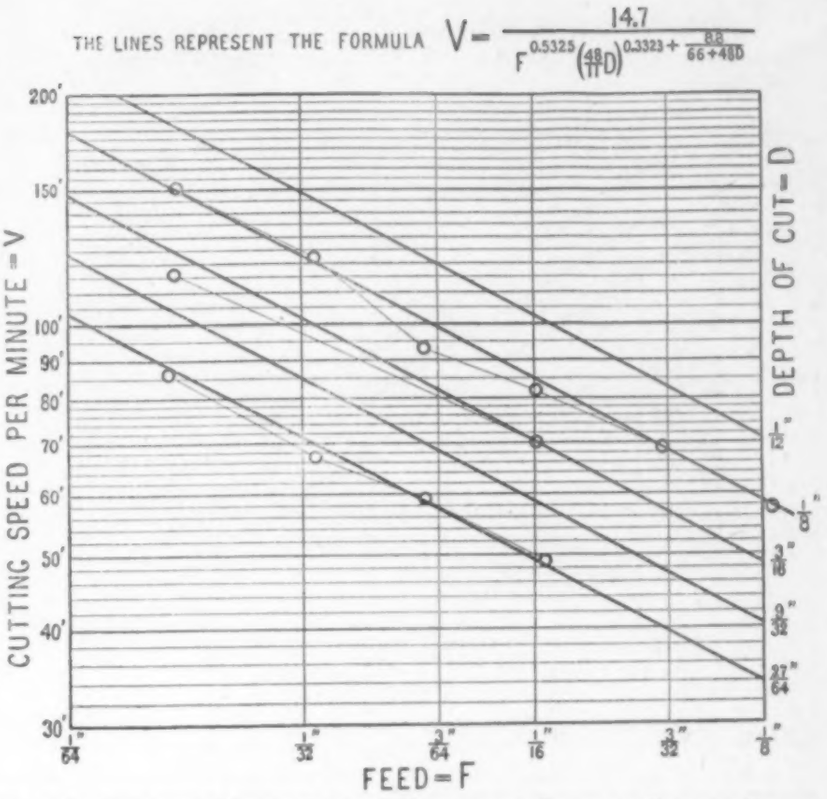


FIG. 106.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard 1-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope 14 degrees. Experiments made at Wm. Sellers & Co., Inc., Philadelphia, 1902.

the three different grades of hardness in the three qualities of cast iron.

Influence of the Quality of Metal.

With high speed tools as originally developed by us the quality of the metal being cut had a very marked influence upon the laws governing the effect of varying the feed and the depth of cut upon the cutting speed. The following is

TABLE 107.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard ½ x ¾-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Experiments plotted on logarithmic paper in Fig. 108.

DEPTH OF CUT IN INCHES	FEED IN INCHES		CUTTING SPEED IN FEET PER MINUTE FROM EXPERIMENTS		CUTTING SPEED, IN FEET PER MINUTE BY THE FORMULA
1/12	0.015		174½		175.9
	0.026		119		122.0
	0.035		98		100.1
	0.0458		86		83.7
	0.0592		70		70.6
1/8		0.0244		111	111.3
	0.0255		115		108.0
		0.033		99	91.0
		0.046		73	73.0
	0.046		71		73.0
3/16		0.014		141	142.1
		0.020		111	112.1
	0.026		95		94.2
		0.0318		82	82.4
		0.0435		65	66.9
	0.046		60		64.4
		0.0625		50	52.5

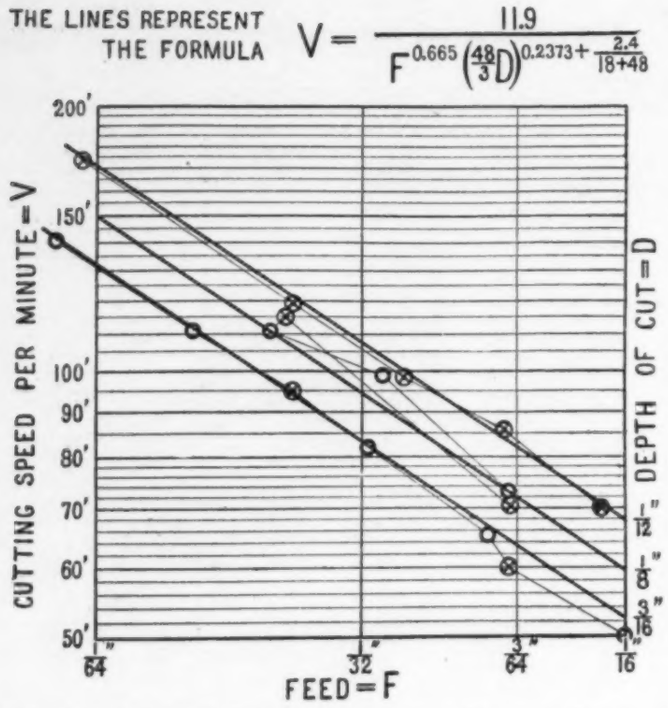


FIG. 108.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING STEEL.

Experiments made with standard ½ x ¾-inch round nose roughing tool; clearance angle, 6 degrees; back solpe, 8 degrees; side slope, 14 degrees. Experiments made at Wm. Sellers & Co., Inc., Philadelphia, 1902.

an illustration of this effect.

TOOL NO. 26.

Tungsten	8.00
Chromium	3.80
Carbon	1.85
Manganese	0.30
Silicon	0.15
Phosphorus	0.025
Sulphur	0.030

TOOL NO. 27.

Tungsten	8.40
Chromium	1.86
Carbon	1.43
Manganese	0.23
Silicon	0.126

With high speed steel of the following chemical composition indicated for tools knows as Nos. 26 and 27 (the original high speed tools developed by Messrs. Taylor & White) the quality of the tool steel was such that in cutting medium and hard steels, there was practically no increase in the cutting speed of the tool when feeds were used which were finer than 1-16 of an inch; in other words, a feed of 1-64 inch, 1-32 inch and 1-16 inch all had about the same cutting speed.

On the other hand, with tools of this quality in cutting a very soft forging, there was about the same proportionate gain in cutting speed on a cut taken with a 1-32 inch feed over a cut taken with a 1-16 inch feed, as there was with a cut taken with a 1-16 inch feed over that taken with a ⅛ inch feed.

As an illustration of this fact, we give three cutting speeds, which were taken on a soft forging of the following chemical composition and physical properties:

Carbon	0.22 per cent
Manganese	0.42 per cent
Silicon	0.07 per cent
Phosphorus	0.022 per cent
Sulphur	0.025 per cent
Tensile strength	56,250 pounds
Elastic limit	26,590 pounds
Percentage of stretch	35.50 per cent
Percentage of contraction	56.26 per cent

These experiments, which were very carefully made with standardized ⅞-inch high-speed tools of chemical composition

Tungsten	8.50
Chromium	2.00
Carbon	1.85
Manganese	0.15
Silicon	0.15

on a forging of uniform metal gave the following cutting speeds:

	Per Minute.
For 3-16 in. depth x 1-16 in. feed	120 ft.
For 3-16 in. depth x 1-32 in. feed	180 ft.
For 3-16 in. depth x 1-64 in. feed	260 ft.

Thus it is seen that as the shaving or chip grows thinner, the cutting speed grows more rapid even in taking very fine feeds, whereas, as just explained above, with these same tools in cutting the medium or harder metals, no gain in cutting speed resulted from finer feeds than 1-16 of an inch.

One of the great improvements of the latest high-speed tools over the original high speed tools lies in the fact that a tool, for instance, of the chemical composition of tool No. 1,[5] (the best modern high-speed tool), makes approximately the same gain in cutting speed when using very fine feeds in cutting even very hard steel as the original tools made only when cutting the very softest of steels. And this again is of truly great importance to the average machine shop, since in the average shop more cuts are taken with feeds finer than 1-16 inch than with coarser feeds, and therefore a proportionate increase in cutting speed is made possible by the latest tool steels over fully one-half of the work in which no such gain was possible with the original tools.

As an illustration of this fact, we give the following experiments made by us during the summer and fall of 1906 with modern high speed tools in cutting very hard metals with fine feeds. The following are the details of one of these experiments made with a tool of the composition

Tungsten	14.71
Chromium	2.90
Carbon	0.70
Manganese	0.12
Silicon	0.96
Phosphorus	0.017
Sulphur	0.010

in cutting a hard steel bar having the following chemical composi-

TABLE 110.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING CAST IRON.

Experiments made with standard ¾ x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. For experiments plotted on logarithmic paper see Figs. 111, 113 and 114. For experiments plotted on ordinary cross section paper see Fig. 112. Experiments made at Wm. Sellers & Co., Inc., Philadelphia, 1903.

		Casting of 1.1 per cent silicon		Casting of 1.12 per cent silicon		Casting of 1.2 per cent silicon	
		Cutting speed in feet per minute		Cutting speed in feet per minute		Cutting speed in feet per minute	
Depth of cut, inches	Feed inches	From experiments	By formula constant = 54	From experiments	By formula constant = 66.7	From experiments	By formula constant = 70.9
3-32	0.0156	112.0	114.8				
	0.0316	87.0	86.3				
	0.0632	61.0	61.5				
	0.1270	43.0	42.4				
3-16	0.0156	90.5	93.3				
	0.0316	70.0	70.2				
	0.0632	50.0	50.0	63.5	61.8	62.0	65.7
	0.1270	32.0	34.5				
3-8	0.0156					104.0	101.5
	0.0316					78.0	76.4
	0.0632	41.5	41.4			54.5	54.4
	0.1270					35.5	37.5
5-8	0.0156			85.5	83.9		
	0.0316			59.0	63.1		
	0.0632			44.0	45.0		

[5] IRON TRADE REVIEW, March 21, 1907, page 464.

TABLE 109.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING HARD CAST IRON.

This table gives the actual cuts taken by tools in this series and represents one of the best sets of experiments made in turning cast iron. Tool used, standard ¼ x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Place and date of experiments, Wm. Sellers & Co., Inc., Philadelphia, 1903, tool heated to melting point and cooled in air blast.

Composition of tool: Tungsten, 14.71; chromium, 2.90; carbon, 0.70; manganese, 0.12; silicon, 0.196; phosphorus, 0.017; sulphur, 0.01. Meaning of symbols: G = good; F = fair; BR = began to ruin; R = ruined.

DEPTH OF CUT IN INCHES	FEED 0".0156					FEED 0".0316					FEED 0".0632					FEED 0".127				
	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL	EXPERIMENT NUMBER	MARK ON TOOL	SPEED IN FEET PER MINUTE	DURATION OF CUT IN MINUTES	CONDITION OF TOOL
3/32	1475	BS22	121.2	7.2	BR	1472	BS22	90 4	14 0	BR	1467	BS22	61.3	20 0	G	1481	BS6	45.4	12 2	F
	1476	BS20	112.4	6 5	BR						1469	BS20	65.5	10 2	BR	1482	BS11	47.6	12 4	BR
	1477	BS13	112.4	6 8	BR						1470	BS20	63 3	6.3	BR					
	1478	BS22	105.0	21.4	G						1474	BS20	63 0	7.7	BR					
	1479	BS22	112.0	22.2	G															
	Conclusion		112	20	6	Conclusion		87	20	6	Conclusion		61	20	6	Conclusion		43	20	6
3/16	1446	BS11	90.0	20 7	G	1443	BS11	70 2	20.0	F	1436	BS6	45.0	20.0	G	1423	BS3	35 4	4.7	BR
	1447	BS11	90 0	20 0	G	1444	BS6	70.2	12 4	BR	1437	BS10	50 0	12.3	BR	1424	BS5	30 1	20.0	F
	1448	BS6	90.0	10.4	BR	1445	BS10	70 2	9 0	BR	1438	BS11	50 3	25.0	G	1426	BS6	29.8	20.0	G
	1450	BS12	90.5	19.8	G						1439	BS12	55.4	5 3	BR	1427	BS10	31.9	13.0	BR
	1451	BS11	95 0	10.4	BR						1440	BS12	55.4	7 2	BR	1428	BS11	31 9	16.4	G
											1459	BS22	49 9	20.0	BR	1429	BS5	32 2	3.9	BR
											1460	BS20	49 9	19.1	BR	1430	BS6	32 2	20.0	F
																1431	BS10	30.3	20.0	F
																1432	BS11	32 2	20.0	G
																1433	BS12	35 1	16 8	G
	Conclusion		90.5	20	6	Conclusion		70	20	6	Conclusion		50	20	6	Conclusion		32	20	6
3/8											1461	BS22	38 5	25.1	G					
											1462	BS20	41 1	22.2	BR					
											1468	BS11	42 2	17.8	G					
											1471	BS13	40 3	20 0	G					
											1473	BS13	43 5	11.4	G					
	Conclusion					Conclusion					Conclusion		41.5	20	6	Conclusion				

tion and physical properties, our standard ⅞-inch round nosed tool being used in these experiments. The two figures for each property are due to the bars being taken from each end of the forging.

PHYSICAL PROPERTIES.

Tensile strength	91,670	pounds
" "	101,860	"
Elastic limit	60,090	"
" "	53,980	"
Stretch	7	per cent
"	5	"
Contraction	11.66	"
" "	9.73	"

CHEMICAL COMPOSITION.

Carbon	1.00	"
Manganese	1.11	"
Silicon	0.305	"
Phosphorus	0.036	"
Sulphur	0.049	"

The following cutting speeds were obtained with our standard ⅞-inch tool with a standard 20-minute cut:

a for .316 inch depth x 1-16 inch feed, cutting speed 41.4 ft. per minute.

b for 3-16 inch depth x 1-32 inch, cutting speed 58.2 ft. per minute.

c for 3-16 inch depth x 1-64 inch feed cutting speed 81.4 ft. per minute.

A comparison of the gain in cutting speed when taking fine feeds on this very hard forging will show that they are not far from proportional to the gain made in taking the fine feeds on very soft metal with the original high speed tools.

We later point out the fact that the reason why the latest high speed tools are liable to make the same proportionate

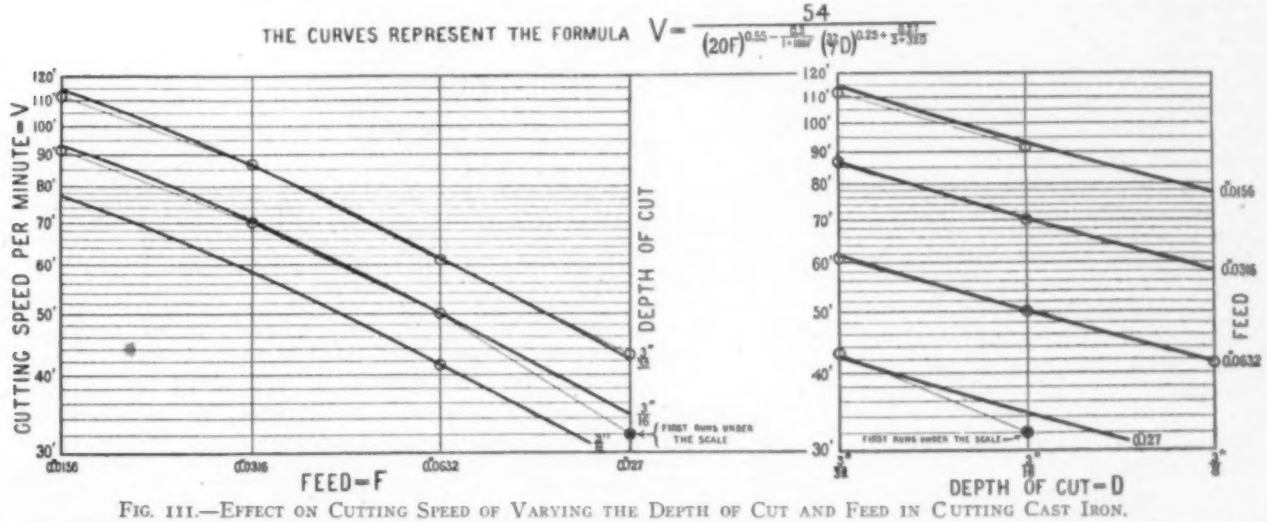


FIG. 111.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING CAST IRON.

Experiments made with standard ¼ x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Experiments plotted on cross section paper in Fig. 112. Place and date of experiments, Wm. Sellers & Co., Inc., Philadelphia, 1903.

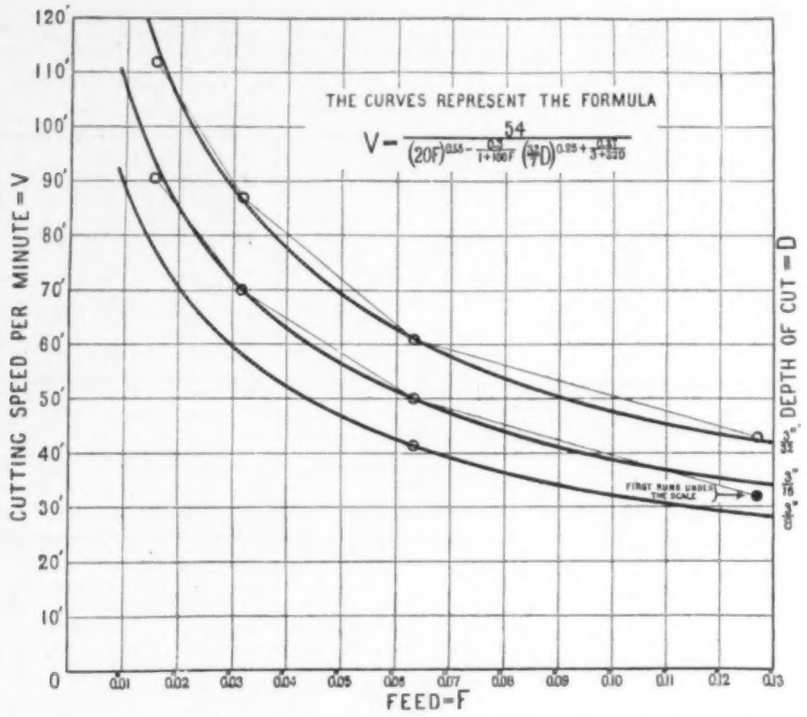


FIG. 112.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING CAST IRON.

Experiments made with standard ¾ x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. Experiments plotted on logarithmic paper in Figs. 111, 113 and 114.

gain with fine feeds in cutting hard metals as when cutting soft metals is due to their possessing in a marked degree the two qualities of "red hardness" and "hardness." The original tools as developed by us were deficient as compared with the modern tools in the proper combination of red hardness and hardness.

It will be noted that we have in all cases staaed the chemical composition of the tools with which from time to time our experiments as recorded have been made. We also give some of the details of experiments made with the best modern high speed tools for the purpose of accurately comparing the various cutting properties of these tools with the cutting properties of various types of tools formerly experimented with by us. As a result of these experiments we have been able to state what we believe to be approximately the proper cutting speeds for high-speed tools under various conditions.

It must be remembered, however, that our comparatively few experiments with these tools did not cover the whole field. We attempted to make what we believed to be typical experiments, but we did not feel satisfied with either the extent or the thoroughness of this work. Therefore, it seems of great importance to more carefully verify the various laws obtained by us through direct experiments with the latest high-speed tools. Among these for the purpose of establishing the fundamental basis upon which rests the effect of varying the feed and the depth of cut upon cutting speed, we think it of particular importance to make a series of experiments with tools having straight line cutting edges, both on the effect of the thickness of the chip upon the cutting speed and upon the effect of the depth of the cut upon the cutting speed. Such experiments should be similar to those made by us upon this subject with carbon tools.

(To be continued.)

Tendered Dinner.—William Lodge, president of the Cincinnati Industrial Bureau, was tendered a dinner by the bureau at the Business Men's Club on March 18. Mr. Lodge has just returned from a trip to Panama. He was one of the party of men who went as members of commercial clubs. There was represented in the party the commercial clubs of Boston, St. Louis, Chicago and Cincinnati. About 90 men of the highest order of business intelligence made the trip at their own expense to see for themselves the progress of the work and to inquire into the conditions prevailing on the isthmus. There was a systematic investigation made, and Mr. Lodge, as the guest of the industrial bureau, spoke of his observations and read extracts from the reports of the various committees. About 100 men attended the dinner. The address was interesting and educational.

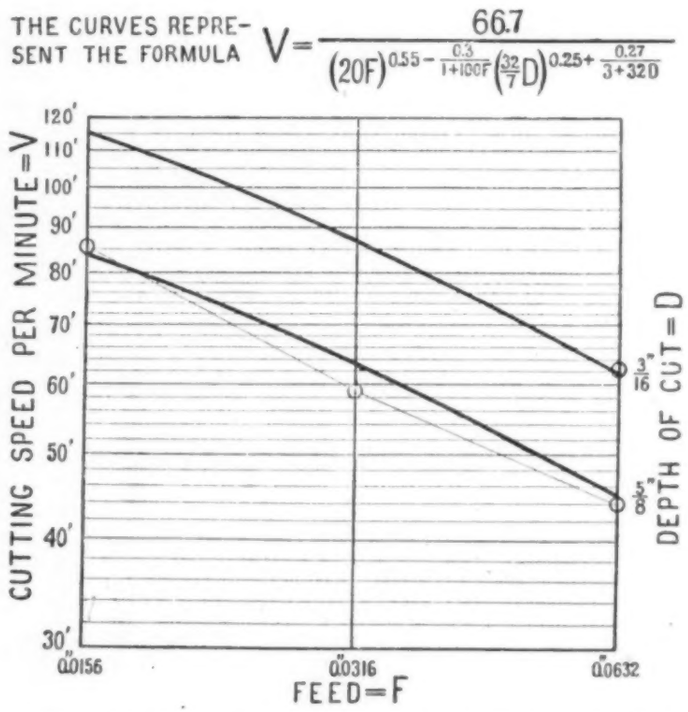


FIG. 113.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING CAST IRON.

Experiments made with standard ¾ x 1½-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. These experiments were made in cutting cast iron of silicon 1.12.

JONES & LAUGHLIN EXONERATED.

Coroner's Jury Finds that Break-out on Jan. 9 Was Unavoidable.

The coroner's jury which inquired into the cause of the break-out of No. 2 furnace of the Eliza group of the Jones & Laughlin Steel Co., which occurred on Jan. 9, completely exonerated the Jones & Laughlin Steel Co., and reported that all known precautions had been taken to insure safety, and that the explosion was accidental.

The jury which was empaneled was a notable one and was unusually well fitted to pass upon a case of this kind. Among the jurors were Charles W. Friend, of the Clinton Iron & Steel Co.; Walter Kennedy, mechanical engineer; Daniel R. Lean, formerly a blast furnace contractor; W. C. Holtzworth, and M. A. Horolerhan, both of whom are connected with the blast furnace operations of the National Tube Co., McKeesport.

The substance of the testimony of Eugene L. Messler, superintendent of blast furnaces of the Jones & Laughlin Steel Co., follows: Eliza furnace No. 2 was completed in September, 1899, and was relined November, 1904. It was shut down again Nov. 28, 1906, while the hopper was being replaced, and at that time the brick work was found to be in excellent condition. The stack was built with a theoretical capacity of 600 tons per 24 hours. It is 100 feet in height, has a bosh diameter of 22 feet, hearth 15 feet, and is 15 feet in diameter at the top. The furnace shell was reinforced with 12 steel bands, each 7½ x 1¼ inches. Since the accident the number of bands has been increased to 15, and they are 2 inches in thickness. This furnace burst its ninth band while being tapped on Jan. 9, 4½ ladles having been filled before the accident occurred. The rivets holding some of the nine bands were sheared by the force of the explosion, while others were broken at points where the strain proved the greatest. Previous to relining in 1904, the best record established by this furnace was 698 tons in 24 hours. Since that time, the output has never gone over 600 tons. On account of local complaints regarding the ore dust nuisance, the furnace has not been worked up to its capacity. The furnace was not overloaded because of the fact that it was built theoretically to carry its burden. The average pressure was about 17 to 19 pounds and it was stated that not for four years had the pressure cards indicated that 26 pounds had been applied. There were about 800 tons of stock in the furnace at the time of the explosion. This furnace was using 84 per cent of Mesabi ore in its charge on the day of the accident. It was stated that the blower had been at the stoves five minutes before the break occurred, and discovered that a hang prevented the charge from moving downward in the furnace. The pressure was reduced, which permitted the hang to slide down, and was later increased. The bands around the furnace jacket were made to withstand a pressure of at least 250 pounds per square inch.

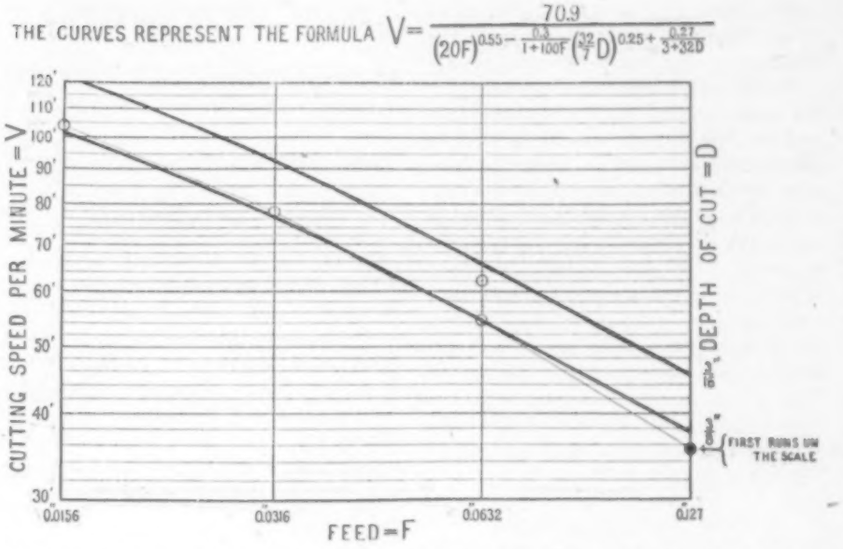


FIG. 114.—EFFECT ON CUTTING SPEED OF VARYING THE DEPTH OF CUT AND FEED IN CUTTING CAST IRON.

Experiments made with standard ¾ x 1⅛-inch round nose roughing tool; clearance angle, 6 degrees; back slope, 8 degrees; side slope, 14 degrees. These experiments were made in cutting cast iron of silicon 1.20.

Mr. Messler expressed the opinion that the accident was a very rare one and according to his theory there must have been two hangs, one of which slipped down when the blast was reduced, and the other unknown.

John A. West, head blower, testified that he took the blowing pressure at 5:30 p. m. on the day of the accident, and kept checking it up every seven or eight minutes. The hang slipped five feet and by watching the gas in the stoves and the effect at the top of the furnace, he was able to approximately estimate the extent of the slip. As the gas in the stoves was slack, he concluded that the furnace had a hang.

Howard A. McKain, general manager of the Riter-Conley Mfg. Co., Pittsburg, visited No. 2 furnace of the Eliza group the day following the accident. He did so out of curiosity and not at the request of any officers of the Jones & Laughlin Steel Co. He stated that he had had 12 years' experience as an engineer in blast furnace construction and that the capacity of the furnace was arrived at by the height, diameter, bosh measurement, and previous experience of furnaces having similar dimensions. There is no fixed rule, however, as the operation and the quality of ore and fuel have much to do with the production. The bands, he added, were the average size, and the brick work was intact, and he concluded that the furnace must have been in good condition prior to the accident. He considered the construction of the bosh sufficiently strong to carry the burden.

James Scott, superintendent of the Lucy and Isabella blast furnaces of the Carnegie Steel Co., testified that he inspected the furnace after the accident, inasmuch as he had had similar trouble with his own furnace. He found the bosh plates heavier than the average and the brick work was in a remarkable state of preservation. He considered that 44,000 cubic feet of air was one-third below the capacity of the furnace and added that in the furnace which he operates from 55,000 to 65,000 cubic feet of air per minute is used. The pressure of 16 to 17 pounds was low in his estimation, and he believed that 25 pounds would have been a safe pressure. Mr. Scott further testified that there was no explosion, and that he knew of only one furnace which gave way in a similar manner. This was the Edgar Thomson furnace, at which Capt. Jones lost his life nearly 20 years ago. The break in that stack was caused by the giving way of the bands, which were not of sufficient strength, but those which held the jacket of the Eliza furnace had three times the strength of those mentioned above. He ventured the opinion that the hang in No. 2 furnace

might have fallen from a greater height than the one which caused the accident in the Edgar Thomson stack.

William C. Coffin, vice president of the Riter-Conley Mfg. Co., Pittsburg, was the last witness examined, and inasmuch as his concern built the furnace, he desired to learn by a visit immediately after the accident whether the break was due to improper workmanship. He found that the bosh plates were sufficient to carry the load and that the furnace would stand a pressure of more than 200 pounds per square inch before going to pieces. Not knowing whether the accident was caused by a slip, he returned the opinion that it might have been due to the heavy impact in one spot.

Metal Trades Convention.

(Continued from page 498.)

G. C. Baldwin, Secy. Confectioners' Machinery & Mfg. Co., Boston.
John Bath, Bath Grinder Co., Bath, Me.
Col. A. A. Pope, Pope Mfg. Co., Hartford.
M. J. Boosnan, Kennedy Valve Mfg. Co., Coxsackie, N. Y.
Jas. C. Merrick, Employers' Association, Toronto.
E. E. Allyne, Allyne Brass Mfg. Co., Cleveland.
G. H. Cushing, H. B. Smith Co., Westfield.
J. A. B. Patterson, Standing Gauge Steel Co., Beaver Falls, Pa.
S. Moltrup, Beaver Falls, Pa.
W. J. Young, N. J. Machine Co., Lynn.
W. B. Cowles, Long Arm System Co., Cleveland.
L. F. Gordon, Wyman & Gordon, Worcester.
C. T. A. Vogel, Prentis Jones Mfg. Co., St. Louis.
H. W. Kinkley, Northampton Cutlery Co., Northampton, Mass.
W. B. Post, Billings & Spencer Co., Hartford.
G. K. Simonds, Simonds Mfg. Co., Fitchburg, Mass.
W. E. VanWirt, Holmes & Blanchard, East Boston.
F. F. Woods, S. A. Woods Mach. Co., South Boston.
H. M. Leland, Cadillac Motor Car Co., Detroit.
W. R. McClave, McGove Brooks Co., Scranton, Pa.
D. B. Kirk, C. & G. Cooper Co., Mt. Vernon, O.
L. E. Harper, Becker-Brainard Milling Machine Co., Hyde Park, Mass.
Eugene I. Blount, treasurer J. G. Blount Co., Everett, Mass.
Walter Laidlaw, Laidlaw-Dunn-Gordon Co., Cincinnati.
F. E. Reid, F. E. Reid Co., Worcester.
Walter M. Wood, Manning, Maxwell & Moore Co., Boston.
Paul B. Morgan, Morgan Construction Co., Worcester, Mass.
Elmer F. Smith, G. W. & F. Smith Iron Co., Boston.
Geo. G. Prentice, Geo. G. Prentice & Co., New Haven.
Clifton T. Henry, Henry Mfg. Wks., Boston.
J. Ross Bates, Whiting Fdry Equip. Co., Harvey, Ill.
Irving C. Decatur, Cummings Mach. Wks., Boston.
S. S. Hall, Pickering Governor Co., Portland, Conn.
Geo. I. Alden, Norton Gdg. Co., Worcester.
Chas. F. Putnam, Putnam Mach. Co., Fitchburg, Mass.
Chas. E. Hodges, Amer. Mut. Ins. Co., Boston.
Thos. C. Flinn, Kennedy Valve Mfg. Co., Coxsackie, N. Y.
Jas. F. Kane, Amer. Mut. Liab. Ins. Co., Boston.
M. C. Snyder, J. E. Snyder & Son, Worcester.
Samuel F. Hubbard, Boston.
Willard S. Martin, Mead-Morrison Mfg. Co., Cambridge, Mass.
P. M. Brotherhood, Manning, Maxwell & Moore, Boston.
Edw. M. Woodward, Woodward & Powell Planer Co., Worcester.
Reginald Washburn, Wire Goods Co., Boston.
Clarence J. Wetsel, Baush Mach. Co., Springfield, Mass.
E. W. Pope, Pope-Hartford Mfg. Co., Hartford.

MANY IMPROVEMENTS

AND EXTRAORDINARY REPLACEMENTS BY THE CORPORATION.

Work Completed Last Year and in Progress.—Blast Furnaces, Steel Works and Other Plants.

During the fiscal year ending December 31, 1906, the expenditures for improvements and extraordinary replacements made by the United States Steel Corporation reached the enormous total of $19,016,178.93. These are classified in the annual report by property groups as follows:

Manufacturing Properties	$13,093,181.95
Coal and Coke Properties	1,171,421.53
Iron Ore Properties	312,037.71
Transportation Properties	3,836,885.95
Miscellaneous Properties	602,651.79
Total	$19,016,178.93

The principal improvement and replacement work covered by the foregoing expenditures is shown below.

Manufacturing Properties.

CARNEGIE STEEL COMPANY—Work completed during the year: Edgar Thomson Works, rebuilding three hot-blast stoves; one compound condensing blowing engine; new wharf and changes to producers and sewers. Duquesne Steel Works, new water softening plant; new roll shop and re-arrangement of 26-inch and 21-inch mills. Homestead Steel Works, one boring mill and one planer for machine shop. New Castle Works, 400 kilowatt compound generator and tandem compound engine; improvements and alterations to blooming mill engine; addition to bar mill building and electric shop. Carrie Furnaces, rebuilding four hot-blast stoves. McCutcheon Mills, new 8-inch and 10-inch combination barrel hoop mill; two new 600-horsepower boilers; new slack barrel hoop factory. Lower Union Mills, Youngstown, rolls, cooling beds, furnaces, etc., for 16-inch bar mill; remodeling old 8-inch guide mill; new engine for 8-inch guide mill No. 4. Upper Union Mills, Youngstown, re-arrangement of 7-inch and 8-inch combination mills. In addition a large amount of work was done in improving, remodeling and relining blast furnaces at the various furnace plants.

Work in progress: Edgar Thomson Works, new machine shop; new compound engine for blooming mill; one compound engine for No. 1 rail mill; renewing condenser pumps and providing water supply; ore yard and ore handling machinery; new electric power station; two gas blowing engines for furnaces F and G; four pairs compound blowing engines for furnaces H and I. Duquesne Steel Works, electric storage battery for power plant. Homestead Steel Works, remodeling 35-inch and 40-inch mills; new water purifying system; new electric crane and crane structure. Bellaire Works, one additional soaking pit; remodeling blowing engine. New Castle Works, additional soaking pit and extensions to buildings; new gas washer. Ohio Works, one 1,000 kilowatt generator and gas engine; new blooming mill, new 30-inch condenser for continuous mill engine.

ILLINOIS STEEL COMPANY—Work completed during the year: South Works, new plant for sintering flue dust; compound engines at rail mill; new ladle repair shop; remodeling furnace in open-hearth plant No. 1; new granulating cinder plant; additional narrow gage track connection; remodeling main office building; installing gas flues; installing coal handling apparatus at slab mill gas producers; remodeling rail mill; raising blast furnace trestles. Joliet Works, new boilers at blast furnace 3, and steam line to rod mill. Milwaukee Works, four new sterling boilers; water intake for pumping station; locomotive crane, with clam shell and steel hammer. In addition a large amount of work was done in improving, remodeling and relining blast furnaces at the various furnace plants.

Work in progress: South Works, rebuilding with modern equipment the ore yard and ore unloading and handling machinery; new machine shop; new hot saw and extension to finishing department, and new cold saw at rail mill; extension to electric repair shop. Joliet Works, two double compound pressure pumps; new splice mill. Milwaukee Works, new 12-inch train engine and roughing rolls; improving and increasing capacity of 8-inch, 9-inch and 12-inch mills; remodeling 21-inch mill; new 500 kilowatt gas engine-driven generator. North Works, new pattern shop and sanitary buildings; four 20-ton locomotive cranes.

THE NATIONAL TUBE COMPANY—Work in Progress: Lorain Works, new ore handling machinery; five batteries, 800-horsepower water-tube boilers; ten McKenzie stokers and ash handling plant; condensing plant and two shape mill reversing engines; one heating furnace and three gas producers; enlargement of hydraulic mains. Considerable work in remodeling and improving blast furnaces is in progress.

LORAIN STEEL COMPANY—Work in Progress: Johnstown Works, new building; turntable; extension of buildings and new machinery.

NATIONAL TUBE COMPANY—Work completed during the year: National Works, three locomotives. Riverside Department, new pipe warehouse; locomotive traveling crane. In addition a

large amount of work was done in improving, remodeling and relining blast furnaces at the various furnace plants.

Work in progress: National Works, two-thirds cost of remodeling, rebuilding and enlarging McKeesport plant (remaining one-third cost is charged construction—for particulars of the new work in progress at this plant see details of expenditures for construction. Pennsylvania Department, two lap weld furnaces and bending furnaces for each. Continental department, new warehouse.

AMERICAN STEEL AND WIRE COMPANY—Work completed during the year: DeKalb Works, additional buildings and new steel hoop machine. Rockdale Works, installing ventilating system; new electric hoist and sprinkler system; Stirling boiler and addition to boiler house; large turret lathe; convertible speed motors on Nos. 1, 2 and 3 galvanizing frames. Waukegan Works, rearranging No. 3 rod mill; additional electric unit; additional machinery; extension to galvanizing room. Consolidated Works, water standpipe; new electric power plant, with motors, engine and generator. American Works, building 24 rod block cranes. H. P. Works, one Corliss engine; water supply system. Newburg Steel Works, coal distributor at No. 1 blooming mill boiler house; 50 ingot cars; one duplex pump; 15 charging cars and 60 charging boxes; one ingot soaking pit. Newburg Wire Works, new office building; new feed water pump and pipe. Central Furnaces, cast house and crane; 12 hot metal cars; building over casting machine and traveling crane. Rankin Works, water softener; erecting tandem compound engine and flywheel, complete; new carpenter and pattern shop. Shoenberger Works, new 5-hole pit furnace; installing mechanical stokers and ash handling machinery; extending No. 2 blooming mill building and crane runway; replacing 72-inch plate mill building; Cahall boilers. Allentown Works, galvanizing nail plant. North Works, Worcester, two horizontal tubular boilers; new pumping engine for yards and mill water supply. Rope Works, equipment for making flattened strand rope. Spring Works, equipment for storage and delivery of oil for tempering. Pacific Works, building No. 8 strand machine. In addition a large amount of work was done in improving, remodeling and relining blast furnaces at the various furnace plants.

Work in progress: Newburg Wire Works, compounding reversing engines; new galvanizing plant; changes to make connection with Newburg & South Shore railway. Central Furnaces, re-arranging bins and scale cars; electric power equipment and line to Newburg wire mills. American Works, new condenser pumps; water supply intake. Consolidated Works, replacing boiler plants at wire and rod mills. H. P. Works, general power improvements; rod mill engine; wire and machine mill engine; condensing plant. Rockdale Works, new pot annealing equipment. DeKalb Works, additional electric unit. Anderson Works, additional electric unit. Shoenberger Works, new warehouse and pattern store house. Rankin Works, automatic sprinkler system; new rod mill finishing engine; additional tools. Allentown works, water purifying plant; new rod mill boiler and engines. Neville Works, enlarging car dumper. River division, surface condensers for steamers. South Works, Worcester, reconstruction and enlargement of rail bond department; equipment for producing copper rods; spray nozzle equipment; economizer equipment for boiler plant; gas-driven electric unit; changes at open-hearth department to burn coal instead of oil; installation of compound pump, with building. North Works, Worcester, one large pumping engine; changes in annealing and cleaning house, and new dry house; additional furnace capacity, galvanizing department.

AMERICAN SHEET AND TIN PLATE COMPANY—Work completed during the year: Vandergrift Works, new pattern storage house; extending natural gas line; new steel warehouse and 30-ton crane. United States Works, additional annealing furnace and gas producer; new chemical laboratory. New Castle Works, traveling crane for hot mill building. Pittsburg Works, extension to hot mill building, with crane; new assorting room. Aetna-Standard Works, expanded metal machine; galvanizing plant; three additional galvanizing pots. American Works, additional equipment; new warehouse and box room; store building, machine shop and pot repair shop. Cambridge Works, modernizing plant. Chester Works, additional annealing furnaces and equipment. Dover Works, new building and crane over-rolls. Laughlin Works, one 500-horsepower boiler and heater; chain grates under boilers. Leechburg Works, one 250-horsepower boiler and installation. Morewood Works, changing equipment to use coal instead of gas for fuel. National Works, installing boilers; water purifying system; one compound air compressor. Shenango Works, annealing furnace and gas producer; water purifying system. Wellsville Works, new warehouse; coal handling machinery; extension to annealing house and two additional annealing furnaces; one 15-ton crane for hot mill building. Wood Works, building extension to warehouse.

Work in progress: Vandergrift Works, replacing old stokers for 42 boilers with new stokers of chain grate type; stripping plant and equipment. United States Works, constructing crane runway. Pennsylvania Works, general improvements. Aetna-Standard Works, two traveling cranes; converting heating and annealing furnace from gas to coal. Dover Works, building extension to buildings and new corrugating machine. Midland Works, changing four annealing furnaces from gas to coal. Morewood Works, water purifying system.

SHELBY STEEL TUBE COMPANY—Work completed during the year: Shelby Works, rebuilding piercing mill; improvements in shipping room and installing new engine for electric generator; one rotary straightening machine; one reeling machine. Ellwood Works, one roll straightener and one annealing furnace.

Work in progress: Seamless plant, Ellwood City, Pa.—Concentration of and rebuilding seamless mills.

AMERICAN BRIDGE COMPANY—Work completed during the year: Lassig Plant, four 10-ton electric assembling hoists. Elmira Plant, new office building; templet shop and equipment. Pencoyd Plant, reconstruction of blooming mill furnace. Trenton Plant, extending crane runway; new plate shears; new air compressor. American Works, one 10-ton locomotive hoisting crane. Shiffler Works, improving plant, including gas engine and air compressor; new store house and oil house; plate straightening rolls, with motor. St. Louis Works, new motor-driven beam shear.

Work in progress: Pencoyd Works, elevated track system to charging platforms of open-hearth furnaces; three angle straightening machines; improvements to the 20-inch and 23-inch and 28-inch mills; pumping engine; settling and storage tank. Edge Moore Works, new locomotive building and sewer track scales.

UNION STEEL COMPANY—Work completed during the year: Donora Works, new air and rotary pump; 22-inch ingot box for open-hearth department; one 5-ton crane; five fence machines. South Sharon Works, new stripper for blooming mill; improvements for loading blooms and billets; enlarging ore bins; conveyor in nail mill warehouse; 10 new cinder ladle cars; new locomotive shed; relining and improving furnaces; new rod mill heating furnaces; installation of hot water system; new 15-ton crane. Mercer Works, remodeling sheet mill, including installation of bray mills; replacing sheave wheels in sheet mill. Sharon Tin Plate Works, increasing capacity of finishing department.

Work in Progress: South Sharon, 12-inch steam line from blast furnace boilers to blooming mill boiler house; equipping Geary boilers with stokers and coal and ash handling machinery. Donora Works, two magnets in stock house;

one air compressor; new water purifying plant.

CLAIRTON STEEL COMPANY—Work completed during the year: Fire protection system; new fire proof floor in electric power house, blowing engine house and main pumping station.

Work in Progress: Constructing 18-inch steam line from blast furnace boilers to steel mill department.

Coal and Coke Properties.

H. C. FRICK COKE COMPANY—Work completed during the year: New plants containing 900 coke ovens and opening up coal property in connection therewith, viz.: York Run mine, 500 coke ovens; Shoaf mine, 200 coke ovens; Bitner mine, 200 coke ovens; Buffington mine, automatic engine stop; Continental No. 1 mine, one Covington coke drawing machine. Central mine, installing air compressor and piping. Crossland mine, 20 coke ovens with complete equipment for operation. Kyle mine, changing tracks at coke yard siding. Leisenring No. 3 mine, installing larger fan; boiler house; boiler and piping. Marguerite mine, changing haulage to tail rope system. Redstone mine, installing compressed air haulage and enlarging pumping equipment; one Covington coke drawing machine. Youngstown mine, new dip haulage complete. Buckeye mine, new pump. Calumet mine, new wood-lined pump. Hecla Mine No. 3, installing tail rope haulage system; installing air compressor with building; equipping 450 cars with air brakes.

Work in progress: York Run mine, additional machinery for power plant. Shoaf mine, 144 coke ovens with complete equipment for operation; 15 blocks of houses. Bitner mine, 100 coke ovens, with complete equipment for operation; 10 blocks of houses, with water supply connections. Lambert mine, 28 coke ovens, with complete equipment for operation. Wynn mine, 170 coke ovens, with complete equipment for operation; 20 blocks of houses and store buildings. Buffington mine, 26 coke ovens, with complete equipment for operation. Continental No. 2 mine, 26 coke ovens, with complete equipment for operation. Kyle mine, new shops; viaduct; bin; chain hoist; mine tracks and grading; electrical equipment. Oliphant mine, installing electric haulage system; electrical locomotive and trolley wire.

Ore Properties.

Work completed during the year: Chapin mine, new shaft equipment; improvements to hydraulic plant; new turbine and pipe line. Norrie-Aurora mine, new steam line. Fayal mine, electric haulage. Adams mine, dry house and captain's office; 10 side dump stripping cars. Pioneer mine—improving line circuit; replacing four controllers on electric locomotives. Lake Superior mine, new dry house; extension to boiler house, sundry machinery. Blue Queen mine, tram hoist; one steam cylinder; one jet condenser. Atlantic mine, remodeling air compressor. Champion mine—general alterations and improvements to machinery.

Work in progress: Riverton mine, steam piping, feed water heater and tank. Norrie-Aurora mine, hoisting plant; pumping plant; boiler house; trestles; rails and cars; steel shaft house; hoisting machinery, etc., for power plant, shaft 4; steel shaft house, hoisting machinery, etc., for power plant at East Norrie; changes in hoisting and boiler plants at No. 6 Norrie. Pioneer mine—new shaft house; barn; oil house; laboratory; crusher house; pumping plant, etc. Vermillion range district—dry house; 8 motors; stockpile trestle; six 5-ton cars; 2 generators and sundry machinery for Sibley, Savoy and Zenith. Mountain Iron mine, 18 dwellings; carpenter and blacksmith shop with tools; boiler; electric light and power plants; pump plant; locomotive house; 10-ton locomotive crane; hoists; pumps; drills; tracks; coal dock with pockets; warehouse; storage dock; coal trestle; oil house. Lake Superior mine—extension to repair shop and equipment; new boiler plant and water tank. Blue Queen mine—3 electric mine locomotives; thirty 3-ton steel cars; one return tubular boiler. Fayal mine—coal trestle; pumps and piping; head frame; hoisting engine; steel rails; electric haulage for No. 4 shaft, consisting of engine, generator, four 30-horsepower electric mine locomotives; 30 steel gable bottom cars. Genoa mine—boiler plant; engine house, including hoist and electric light plant; steel shaft house; sundry equipment. Soudan mine—installing exhaust heating system and water tank. Clark mine, moving 10 buildings; moving and remodeling shaft house. Aragon mine—laboratory; dry house; office and warehouse building; repair shop; tools; steel rails. Chapin mine—installing Cornish pump in "C" Ludington.

Transportation Properties.

BESSEMER & LAKE ERIE RAILROAD—Expenditures aggregating $596,857.93 included $366,543 fer new second tracks; $23,346.86 for sundry items of right-of-way; $21,160.97 for office, station and other buildings; $87,178.81 for tracks, sidings and cross overs; $70,933.50 for bridges, culverts and trestles; $12,442.42 for telegraph and telephone lines and interlocking systems; $15,252.37 for sundry improvements.

UNION RAILROAD—Expenditures to the amount of $392,024.36 included $166,051.39 for purchase of real estate and cost of enlarging the Oak Hill yard, including bridges and culverts, excavating, filling and tracks; $181,181.86 for building a connection from the Monongahela river branch to tracks on the river bank, including piers, bridges, viaducts, retaining wall, filling and tracks; $22,160 for two locomotives. The balance was expended for sundry improvements.

ELGIN, JOLIET & EASTERN RAILWAY—Expenditures aggregating $132,138.75 included $110,545.03 for 110 gondola cars, wooden bodies, steel underframe, purchased for replacement; $14,140.71 for new 100-ton steam wrecking crane; $8,881.93 for boiler washing system at Joliet. Balance for sundry improvements.

CHICAGO, LAKE SHORE & EASTERN RAILWAY—Expenditures aggregating $407,402.36 included $137,558 for rebuilding coal dock, Two Harbors; $41,970.14 for rebuilding ore dock No. 5, Two Harbors; $58,393.04 for new central electric power plant, complete, Two Harbors; $66,028.17 for second main track, Colby to Summit. The balance was expended for sundry tracks, trestles and additions to buildings.

DULUTH, MISSABE & NORTHERN RAILWAY—Expenditures aggregating $185,712.15 included the following: $49,852.96 for new reservoir, new depot and office building and water sewer at Proctor. At Duluth $11,511.33 for rebuilding Old Lodge docks and relaying tracks; $35,162.09 for spur to Pillsbury open pit and yard tracks; $31,820.83 for Hull mine yard and new entrance to Hull open pit mine, complete, including five new sidings and two miles of track; $31,788.13 for new entrance to Burt open pit mine, complete, including 4.11 miles of track; $15,897.04 for one-half of expenditures made for dredging ship channel from ore docks to the Superior ship channel.

DONORA SOUTHERN RAILROAD—Retaining wall along the Monongahela river, $5,500.94.

PITTSBURG STEAMSHIP COMPANY—Expenditures aggregating $1,631,509.51 included $1,581,004.46 for balance cost of 4 new 12,000-ton steel steamships added to the fleet in 1906, replacing to this extent tonnage previously lost and sold; $34,608.01 for improvements to fleet and installing wire mooring machines; $15,897.04 being one-half cost for dredging ship channel from D., M. & N. Ry. dock to the Superior ship channel.

PITTSBURG & CONNEAUT DOCK COMPANY—Expenditures aggregating $22,435.46 included $19,464.32 for new rope haulage system for dock No. 4, and $2,971.14 for changing 12 McMyler ore unloaders to operate by electricity instead of steam power; automatic trimming device for car dumpers.

Stock Market Shows Traditional Slump.

Following its traditional conduct of declining, after rallying from a long period of stock demoralization, the market in securities has ruled in a weak and feverish condition in the period under review. After a return of weakness on Monday and Tuesday of the past week, a slight rally was apparent on Wednesday and Thursday, but on Friday there was a sharp break with continuing depression on Saturday. Declines were general. The railroad average which on March 14 fell to 99.71 and then on March 16 rallied to 108.71, fell during the past week to 100.77, only 1.06 above the low panic point. The reaction from the quick rebound of prices is not surprising, as the recent gains in quotations have afforded a favorable opportunity for liquidation, and the selling of stocks of people who were carried through the crisis by others or with difficulty mustered up resources themselves to weather the storm. The impression prevailing that the liquidation in Wall street must inevitably communicate itself to out-side business continues not to be borne out by actual events, and the high tide of prosperity in the industrial and business world appears unaffected. Interest is now centered on the crops and their productiveness or failure is expected to wage great influence in the unsettled market. Severe declines in steel stocks were noted in the week, particularly those of 10 points in Lackawanna Steel, 7 points in Railway Steel Spring common, 7 points each in Republic Iron & Steel common and preferred, 8 points in Virginia Iron, Coal & Coke, and 6½ points in American Locomotive common. The money situation of the week had its principal development in the action of the Bank of France in advancing its rate of discount to 3½ per cent, the first change it has made in seven years. This is regarded as significant of the strain to which the money markets of the world are now being subjected. The fact that Europe owes the United States a large amount of money from purchases of products for the payment of which the New York banks have not as yet seen fit to draw gold from the foreign markets, seems to explain the increase. Sooner or later the favorable balance to the United States must be paid, and the Bank of France, it is believed, is preparing for this near withdrawal of gold. The bank statement was fair, showing a decrease in cash of $3,587,000 and an increase in cash of $1,218,900. With a gain of $1,676,350, the surplus is now $4,709,450, which is less than corresponding weeks in nine years. Call loans in the New York market averaged 4 per cent, as against 10 per cent last week, and time loans 6½ per cent, against 7½ per cent last week. Total transactions in the New York exchange during the week were 5,743,450 shares against 9,360,000 last week and 3,643,600 the corresponding week of last year.

Financial Notes.

Among the recent dividend declarations are the following: American Screw Co., regular quarterly dividend of 2½ per cent, payable March 30; Tennessee Coal & Iron Co., regular quarterly dividend of 1 per cent on the common stock and 2 per cent on the preferred stock, payable May 1; New York Air Brake Co., regular quarterly dividend of 2 per cent, payable April 22; Westinghouse Electric & Mfg. Co., regular quarterly dividend of 2½ per cent on the preferred and the assenting and the non-assenting stocks, payable April 10; Rhode Island Perkins Horse Shoe Co., regular quarterly dividend of 1¾ per cent and an extra dividend of ½ of 1 per cent on the preferred stock, payable April 15; American Shipbuilding Co., quarterly dividends of 1¾ per cent on the preferred stock, payable April 15, and 1 per cent on the common stock, payable June 1; American Iron & Steel Mfg. Co., 2 per cent on the common and preferred stocks, ⅝ of which is payable April 1 and the remaining ⅜ is reserved pending present litigation; American Locomotive Co., regular quarterly dividend of 1¾ per cent on the preferred stock, payable April 22, and 1¼ per cent on the common stock, payable May 27; Hall Signal Co., regular annual dividend of 6 per cent, a dividend of ½ of 1 per cent on the preferred stock and the regular quarterly dividend of 1¾ per cent on the common stock, payable April 1; Crucible Steel Co., quarterly dividend of 1½ per cent, preferred payable March 30.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Mar. 23	Changes In Week	Date 1907 Ann. Meet.	Stock Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Pay.
Allis-Chalmers	12¼	+ ⅛	Sept.	19,820,000		.....	.....
Allis-Chalmers pr	27⅛	−1⅜		16,150,000	7 cum	.....	Feb., 1904
American Can	6¾	.....	Feb.	41,233,300		.....	.....
Am. Can pr	51	− ⅜		41,233,300	7 cum	5 Q.	Jan., 1907
Am. Car and Fdy	33⅝	−4⅜	June 27	30,000,000		2 Q.	Jan., 1907
Am. Car and Fdy pr	97	−1		30,000,000	7 n. c.	7 Q.	Jan., 1907
American Loc	60	−6¼	Oct. 5	25,000,000		1¾	Feb., 1907
American Loc. pr	105¼	− ⅝		24,100,000	7 cum	7 Q.	Jan., 1907
American Ship.	66	−4	Oct. 2	7,600,000	6	1 Q.	Mar. 1907
American Ship. pr	108¾	.....		7,900,000	7 n. c.	1¾ Q.	Jan. 1907
Am. Steel Foundries	8	− ⅛	Oct. 1	15,810,000		.....	.....
Am. Steel Foundries pr	37	−1⅜		17,240,000	6 cum	.....	Aug., 1904
Barney & Smith	71	.....	June 4	2,000,000	4	4	Mar., 1907
Barney & Smith pr	135	.....		2,500,000	8 cum	8 Q.	Mar., 1907
Bethlehem Steel	11¼	− ⅛	April 2	14,862,000		.....	.....
Bethlehem Steel pr	45	−5		14,908,000	7 n. c.	5 Q.	Feb., 1907
Cambria Steel	35¼	−3¾	Mar. 19	45,000,000*	6	3 Q.	Feb., 1907
Cambria Iron	47	.....		8,468,000*	4	4 S. A.	Oct., 1906
Chicago Pneumatic Tool	45	.....	Feb. 18	6,145,800	4	4 Q.	Jan., 1907
Colorado Fuel	32½	−3½	Oct. 21	30,132,000		.....	Apr., 1902
Crucible Steel	9	− ⅜	Oct. 16	24,578,400		.....	.....
Crucible Steel pr	70	−4		24,436,500	7 cum	6	Mar., 1907
Empire Steel	8	.....	Feb. 27	2,281,400		.....	.....
Empire Steel pr	49	.....		2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	95	.....	Feb. 19	1,000,000	6	7 Q.	Feb., 1907
Fay & Egan pr	128½	.....		1,000,000	7 cum	7 Q.	Feb., 1907
General Electric	144	−3⅛	May 14	63,643,600	8	8 Q.	Jan., 1907
Harbison-Walker	9½	− ¼	Jan. 21	18,000,000	6	.....	.....
Harbison-Walker pr	70	.....		9,600,000	6 cum	6 Q.	Jan., 1907
International Pump	30	+1	June 4	17,762,500		2	Apr., 1905
International Pump pr	79	+3		11,850,000	6 cum	6 Q.	Feb., 1907
Lackawanna Steel	50	−10	Mar. 13	34,971,400		.....	.....
Lake Sup. Corp	9½	−1⅛	Oct. 2	40,000,000		.....	.....
New York Air Brake	117	−6	June 18	10,000,000	8	8 Q.	Jan., 1907
Niles-Bement-Pond	130	.....	Feb. 6	5,000,000	6	6 Q.	Mar, 1907
Niles-Bement-Pond pr	105	.....		2,000,000	6 cum	6 Q.	Feb., 1907
Otis Elevator Co	40	.....	March 18	6,350,300		3 A.	Apr., 1906
Otis Elevator Co. pr	85	.....		6,308,500	6 n. c.	6 Q.	Jan., 1907
Penn. Steel	65	.....	May 13	10,750,000		.....	.....
Penn. Steel pr	99	.....		16,500,000	7 n. c.	7 S. A.	Apr., 1906
Pittsburg Coal Co	13¼	+ ⅛	Feb. 11	32,000,000		.....	Nov.
Pittsburg Coal pr	51	+2		32,000,000	7	.....	Apr., 1905
Pressed Stl. Car	32½	−5½	Feb. 20	12,500,000		3	Aug., 1904
Pressed Stl. Car pr	92	−1		12,500,000	7 n. c.	7 Q.	Feb., 1907
Pullman	189	−1	Oct. 17	100,000,000	8	8 Q.	Feb., 1907
Railway Stl. Spring	42	−7	Mar 7	13,500,000		4 S. A.	Mar., 1907
Railway Stl. Spring pr	90	−3¾		13,500,000	7 cum	7 Q.	Mar. 1907
Rep. Iron & Steel	25	−2¼	Oct. 9	27,191,000		.....	.....
Rep. Iron & Steel pr	82	−7		20,416,900	7 cum	7 Q.	Apr., 1907
Sloss-Sheffield	50	−7	Mar. 5	10,000,000	5	5 Q.	Oct., 1906
Sloss-Sheffield pr	100	.....		6,700,000	7 n. c.	7 Q.	Jan , 1907
Tenn. Coal & Iron	137	−2	May 7	22,553,000	4	4 Q.	Feb., 1907
U. S. Pipe & Fdy	34¼	−2¾	June 26	12,500,000	4	4 Q.	Dec., 1906
U. S. Pipe & Fdy. pr	80	+1¾		12,500,000	7 n. c.	7 Q.	Dec., 1906
U. S. Steel	34⅛	−4⅞	April 15	508,302,500	2 n. c.	½ Q.	Mar., 1907
U. S. Steel pr	97⅞	−3½		360,281,100	7 cum	7 Q.	Feb., 1907
U. S. Steel 5's	95	−3⅛		463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	60	−8	Sept. 17	8,641,600		.....	.....
Westinghouse Elec	150	+ ¼	July 24	24,998,700*	10	10 Q.	Jan., 1907
West'ghouse Air Brake	150	.....	Oct. 1	11,000,000*		22½ Q.	Jan. 1907

Par value of shares, $100, except those starred, $50.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Greensboro Boiler & Machine Co., Greensboro, N. C., has increased its capital to $50,000. O. C. Wysong is president of the company.

The Milwaukee Foundry Co., Milwaukee, Wis., has been formed with an authorized capital of $10,000 by Thomas McCarthy, John Mullen and Max W. Nohl.

The Manley-Landreth Machine Co., Joplin, Mo., has been incorporated with a capital of $50,000 by I. E. Manley, Edith C. Landreth and W. H. Landreth.

The Star Drilling Machine Co., Akron, O., has increased its capital stock from $200,000 to $500,000 to provide for extensions and improvements.

The W. A. Buxton Machinery Co., Worcester, Mass., has been incorporated with a capital of $50,000 by Walter A. Buxton, Philip L. Buxton and Lewis A. Woodis.

The Aqua Vending Machine Co., Kittery, Me., has been organized with a capital of $500,000 by A. H. Peavey, O. S. Paul and J. W. Hawes, all of the above address.

The Haynie Machinery & Construction Co., Dallas, Tex., has been incorporated with a capital stock of $20,000 by W. R. Haynie, J. E. Haynie and F. H. Lowrance.

The Canton Brass Co., Canton, O., has been organized with a capitalization of $20,000 by Gordon M. Mather, C. A. Dougherty, John J. McMahon, C. W. Keplinger and C. S. Renkert.

The Uhler-Davis Gas Engine Co., Lincoln, Neb., has been organized with a capitalization of $100,000 by George W. Davis, Francis M. Uhler, T. J. Thorpe and L. E. Wettling.

The Chester Forging & Engineering Co., Chester, Pa., has been incorporated to manufacture tools and machinery. The incorporators are: Joseph Messick Jr., Samuel S. Tompkins and Henry Arnold.

The Cleveland Drop Forging Co., Cleveland, O., has been incorporated with a capital of $25,000 by A. W. Stone, R. T. Price, T. S. Morris, E. J. Hart, L. V. Tupler, D. B. Davis and F. H. Robinson.

The Combination Jack Co., Worthington, Ind., has been organized to manufacture jacks. The capital stock of the company is $10,000, and the incorporators are: Alonzo F. Wilson, Lillie Wilson and Frank Jean.

The Eureka Pump Co., Marion, Ind., has been incorporated for the purpose of manufacturing pumps for all purposes by F. H. Whitcom, W. T. Black, George A. Thomas, F. I. Thomas, D. P. Ragon and E. Rothschild.

The Engineering & Equipment Co., Aurora, Ind., has been incorporated with a capital stock of $25,000 by John Ullrich, Andrew Burke, Floyd C. Dills and Frank B. Shutts to erect and equip a plant to manufacture appliances.

The Paterson Brass Foundry, 148 Market street, Paterson, N. J., has been organized to manufacture brass castings, etc., with a capitalization of $25,000. The incorporators are: Orloff O. Dixon, Percy O. Dixon and Edward Banker, all of the above address.

The Ross Stamping Co., Elyria, O., has been organized with a capitalization of $30,000 to manufacture what is known as the Ross shovel. The incorporators are: W. G. Sharp and J. C. Ross, Elyria; W. A. Donaldson, W. W. Hoffman and A. L. Buchanan, Lorain.

The Manufacturers' Foundry Co., Reading, Pa., has been formed to engage in the manufacture of iron and steel castings. The authorized capital stock is $20,000, and the incorporators are: James R. Witherspoon, Samuel H. Kindle and Edmund J. Lankshaw, all of Philadelphia.

The Union Fork & Hoe Co., Columbus, O., has been organized with $1,100,000 capital to consolidate the United States Hoe Co., of Columbus, and the Continental Tool Co., of Frankfort, N. Y. The organizers are: Thomas F. Connors, E. A. Cole, John W. Kaufman, A. B. Maddis and C. B. Jamison.

The Universal Wrench Co., Boston, Mass., has been organized with a capitalization of $30,000 to put on the market a new wrench particularly adapted to automobile use. The officers of the company are: William Dawson, president; Fred B. Wentworth, treasurer, and F. H. C. Reynolds, 60 State street, Boston, clerk.

Richey, Browne & Donald, Inc., Queens, N. Y., have been incorporated to manufacture iron, bronze, etc. The capital stock is $300,000, and the incorporators are: Percy S. Dudley, 159 Willard street; A. Leonard Broughman, 305 Rugby road, both of Brooklyn; Harry D. Nims, 3 East Forty-eighth street, New York, and others.

The Adcock Foundry & Machine Co., 218 West Front street, Red Bank, N. J., has been incorporated to manufacture castings, machinery and all foundry products. The authorized capital stock of the company is $25,000, and the incorporators are: William S. Adcock and Charles P. Irwin, Red Bank, N. J., and John F. Swackhammer, Middletown, N. J.

New Construction:—

The Weber Foundry Co., Cincinnati, is preparing to build a large addition to its present plant.

The Raquette Foundry Co., Massena, N. Y., has let the contract for the erection of two buildings to its plant.

The Union Mfg. Co., New Britain, Conn., has awarded the contract for the construction and equipment of a new foundry.

The Utica Drop Forge & Tool Co., Utica, N. Y., has just completed a two-story addition 35 x 68 feet of mill construction.

The A. L. Swett Iron Works, Medina, N. Y., has broken ground for the erection of a large brass foundry to be built of stone.

The Detroit Twist Drill Co., Detroit, Mich., has let contracts for the extensive new plant which it will erect in that city.

The Union Refrigerator Transit Co., Milwaukee, has purchased eight acres of land in Williamsburg near that city, and will erect an entirely new plant and repair shop.

The National Machinery Co., Tiffin, O., has prepared plans for an extensive addition to its plant to meet the growing needs of the institution. A portion of the building will be used as a stock room.

F. J. Boas, Philadelphia, has been awarded the contract for the construction of a new plant of the Standard Cast Iron Pipe & Foundry Co. at Bistol, Pa., which will consist of 13 buildings of brick and steel construction.

A new and larger forge room will be erected by the David Maydole Hammer Co., Norwich, N. Y., in order to take care of the increased output of the plant and to place the valuable machinery of the forge room in fireproof quarters.

The Union Drop Forge Co., 76 Ohio street, Chicago, will erect a new plant at Grand and North Forty-fourth avenues. The company has purchased 14 acres of ground all of which will be used for the plant. The price paid for the property was given at $25,000.

The Milwaukee Motor Co., Milwaukee, Wis., has prepared plans for a new plant, one story high of brick,

to be erected in that city. A gas producer plant and machinery and power equipment will be installed.

The Standard Motor Construction Co., builder of gas engines, has purchased a site of 12 acres in Tottenville, N. Y., upon which it will erect a plant to take care of the orders which now overtax the capacity of the Jersey City factory. The new factory will be devoted to marine work. Lewis Nixon, of New York, is president of the company.

The Malleable Steel Range Co., South Bend, Ind., has outgrown its present plant and is now erecting a new one, comprising two three-story buildings 50 x 200 feet of concrete and steel construction. H. G. Chrisman & Co., of South Bend, have the contract for the building complete with the exception of the elevators, plumbing and hot water, which the company will install itself. The company is in the market for motors and exhaust fans.

The Stewart Iron Works, Cincinnati, has taken out a municipal permit for the erection of a new plant. The main structure, wherein the foundry and office will be located, will be 105 x 300 feet. There will also be power house and stable building.

Walter H. Judson, formerly connected with the Pullman Car Co., and at present Portland agent for George W. Evans & Co., dealers in railway equipment, is heading a project to erect one of the largest car building plants on the Pacific coast at Portland, Ore. Locomotive repair shops are also contemplated. Options have been taken on several sites.

The Charleston Iron Works, Charleston, S. C., states that while the recent fire damaged its machinery and other departments, it is now operating its machine, boiler and blacksmith shops and foundry department. The concern is planning to replace or repair the damaged machinery, and is now at work erecting buildings to take the place of those destroyed.

The Collins Iron Works, Geneva, N. Y., recently incorporated, will do a general iron business, making a specialty of steel storage tanks. The plant as planned will be 60 x 200 feet, of steel and cement construction, fully equipped with modern shop machinery. A fully equipped machine shop will be erected in connection. No contracts have as yet been let.

Announcement is made that Crane & Co., Birmingham, Ala., will at an early date begin work on a big foundry to be erected in that city at which all plumbing supplies handled in the several establishments of this big concern will be manufactured. The foundry will be in operation six months from the time that the work is started. The general headquarters of the company are in Chicago and stores are operated in several cities.

The Topeka Foundry, Topeka, Kas., has been purchased and reorganized under the name of the Topeka Foundry & Machine Co. The new company is headed by H. J. Bone, United States district attorney, as president; Charles Gault, vice president; R. L. Bone, secretary, and J. D. Mulvane, treasurer. The plant is being overhauled and remodeled and new machinery is being installed. The company will manufacture a gasoline engine suitable for farming purposes.

The Northern Engineering Works, crane manufacturers, Detroit, Mich., is completing an addition to its plant consisting of an erecting building for electric crane trolleys, about 50 x 100 feet, one story served by a 10-ton electric traveling Northern crane and a two-story addition to serve as a tool room approximately 30 x 50 feet. The buildings are of brick and steel construction with saw tooth roofs. They are practically completed. The new additions will enable this company to handle its rapidly increasing electric crane business more rapidly, and will quite largely increase the output of the plant.

The Southwestern Bridge Co., Joplin, Mo., is erecting an extensive plant in that city for the manufacture of structural steel. The plant is being built in the form of a U and is 260 x 550 feet in dimension. The shops will be equipped with electric cranes and other modern equipment. The material for the construction of the plant is being made in the present shops of the company. H. W. Klare, formerly chief engineer of the Virginia Bridge & Iron Works, is general manager. The officers are: J. K. Wingert, president; Tom Sawyer, vice president; E. J. Tutty, secretary; C. Baker, treasurer, J. H. Blair, chief engineer.

General Industrial Notes:—

The Decatur Car Wheel Co. has begun operations in its plant at Savannah, Ga.

The United Iron Works, Springfield, Mo., has opened a new foundry in that city for the manufacture of all kinds of castings.

At the annual meeting of the stockholders of the Maryland Steel Co., Sparrows Point, Md., all the directors were re-elected.

The Bonny-Floyd Co., recently incorporated to erect a steel castings plant at Columbus, O., is placing orders for engines, blowers and cranes.

The R. J. Dowe Machine Knife Works, Beloit, Wis., reports that it suffered only a slight loss from fire and that it has resumed operations at its plant.

The Union Switch & Signal Co., Swissvale, Pa., has re-elected the following directors: George Westinghouse, Robert Pitcairn, William McConway, George C. Smith, Thomas Rodd, H. G. Prout and John B. Jackson. Mr. Westinghouse was re-elected president.

At the annual meeting of the Cambria Steel Co., George F. Baer, Theodore N. Ely and Frank J. Firth were elected directors for three years. The Cambria Iron Co., at its annual meeting re-elected the present board of directors.

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., states that the recent fire at its plant was a small one confined to a pattern storage, the loss resulting principally from patterns which have been replaced. Operations have not been handicapped.

The Ohio Rail Co., Newark, O., recently incorporated to manufacture rails by the rerolling process, states that its plant will consist of three buildings of steel, brick and stone construction, located on a site of 10 acres. The equipment is now being installed and the plant hopes to be able to reroll rails in June.

The Boss Washing Machine Co., Cincinnati, O., says its recent incorporation was to take over the assets and business of the Boss Washing Machine Co., of which the late Conrad Dietz was proprietor. It is the intention of the new corporation to continue the manufacture of washing machines as heretofore conducted by the old concern.

The Barnes Lock & Foundry Co., Bayonne, N. J., whose plant was destroyed by fire Feb. 23, announces that its business will be continued by the H. J. Valentine Co., 396-398 Grand street, Jersey City, N. J. The Valentine company is now equipping a larger plant to accommodate its additional business in the line of latches, locks and builders' and boat hardware.

The Temple Iron Co., Reading Pa., has elected the following officers: President, George F. Baer; vice president, A. T. Law; secretary, George L. Houser. The directors are: George F. Baer, Joseph S. Harris, E. P. Thomas, F. D. Underwood, Albert Broden, W. H. Truesdale, Thomas P. Fowler, F. C. Smink and George B. Connard. The latter succeeds J. R. Maxwell, of New York.

A factory site has ben purchased by the Ross Oscillating Pump Co., Los Angeles, Cal., recently incorporated,

on which it will erect a $10,000 building to be equipped with machinery for the manufacture of the Ross oscillating pump. The machinery for the plant has been purchased, but the company expects to be in the market for considerable more in the near future. The officers of the company are: Andrew J. Ross, president and treasurer; James Cook, vice president; Ernest W. Pratt, secretary and general manager.

The G. M. Yost Co., Mechanicsburg, Pa., has effected its organization by the election of I. E. Yost, Waynesboro, Pa., president; G. M. Yost, vice president and general manager, and T. J. Kennedy, secretary and treasurer. This company recently purchased the plant of Peter A. Frasee Co., New York, and will engage in the manufacture of the Stephens and Snediker quick acting vises, as well as the Yost parallel machinist vise and other tools. The machine shop has been fully equipped and is now in operation. The erection of a foundry has just been commenced, and its completion is anticipated about the middle of April.

The Buffalo Pattern Works, Buffalo, N. Y., recently incorporated, states that it has purchased all machinery and tools necessary in its business but that it may be in the market later. The concern is the incorporation of the Buffalo Pattern Works, which has been carrying on business since 1893 under the direction of Edward Simon Sr. Increasing business has twice forced the concern to move into larger quarters. Under the incorporation, E. Simon Sr., of the old firm, is president, and H. E. Walter, superintendent of the old firm, is secretary and treasurer. The present location is at 33-37 Mississippi street. Wood and metal patterns of all kinds are being manufactured, but at present the concern is specializing on automobile pattern work.

The Wetherill Finishing Casting Co., 925 Chestnut street, Philadelphia, states that the business has been completely reorganized and is now operating under patents issued and pending by means of which it is casting under pressure, metals of a much higher melting point than has heretofore been successfully accomplished. The company is maintaining a temporary plant in which for a period of about three years it has conducted numerous experiments and where it has filled several large contracts for automobile supplies. A large plant equipped with specially designed machinery is now being erected which it expects to have in operation in the early part of the summer. The company is capitalized at $150,000, and its officers are: S. P. Wetherill, president, E. H. Trotter, vice president; J. P. Wetherill Jr., secretary, and S. P. Wetherill Jr., treasurer and general manager.

Trade Notes:—

The H. B. Smith Machinery Co., 10-12 North Canal street, Chicago, will shortly remove to 105-109 Clinton street.

The Columbia Engineering Works, Portland, Ore., announces that it has changed its name to the Columbia Steel Co., in order to more appropriately indicate its business. The company recently discontinued the engineering and machine shop departments, and is specializing in the manufacture of steel castings and steel logging blocks and tools.

The Ball Engine Co., Erie, Pa., announces that it has opened a branch office at 39 Cortlandt street, New York, for the sale of its automatic and Corliss engines. This office will be under the management of Lancelot Copleston. The company has also opened a branch office in St. Louis under the management of O. L. Collins.

A large shipment of vises was recently made to the Texas Central Railway Co. of Texas by the Pittsburg Automatic Vise & Tool Co., Pittsburg. These tools were ordered for excessive hard service which is seldom encountered around the average shops. The Pittsburg company builds a vise especially adapted for such work.

The office of the Allegheny Ore & Iron Co., the Austen Coal & Coke Co. and the Alma Cement Co. will be removed April 1 to the West street building, West and Cedar streets, New York City. It is also announced that the general office of the Wilmington Iron Co. will be at Wilmington, Del., and the sales office in charge of the general sales agents, Miller, Foster & Co., Real Estate Trust building, Philadelphia.

Joseph T. Ryerson & Son, Chicago, have been awarded the contract for equipping the new plant of the American Car & Foundry Co., Milton, Pa. The new shops will probably be opened this summer and most of the deliveries are called for around four months. The contract calls for a complete hydraulic equipment, riveting machinery, rolls, splitting shears, bevel shears, guillotine shears, punching machinery and minor tools.

The Star Corundum Wheel Co., Ltd., Detroit, Mich., is now located in its new factory, 241-251 Calvary avenue, where it has the most complete equipment for the manufacture of abrasive wheels. The building is of steel and concrete construction and absolutely fire-proof and is a model of its kind. The vitrified wheel department is in charge of J. C. Linder, formerly of the Abrasive Material Co., Philadelphia.

John F. Allen, 370-372 Gerrard avenue, New York City, is in receipt of an order for eight Allen boiler riveters of 108 inch reach designed expressly for the American Car & Foundry Co. for its new plant now in the course of erection at Milton, Pa. This plant now has 17 Allen riveting machines of this type of 96 inch reach which with the present order will make a large and very complete equipment. The eight machines just ordered are to be used on oil tanks for cars.

The Atlas Engine Works, Indianapolis, has just been awarded the contract to furnish water tube boilers for the new central power station to be erected by the government at Washington, which, when completed, will furnish heat, light, and power for the capitol, the congressional library, and the new senate and house office buildings. The new station will be situated at Garfield Park, four blocks south of the capitol, at the intersection of New Jersey and E streets, and will be the largest and most modern plant operated by the government. J. G. White & Co., are the consulting engineers on the work, in addition to whom the government has its own board of experts. The equipment will include 16-600 horsepower Atlas high pressure water tube boilers, equipped with Roney stokers, and 4-2,000 kilowatt Westinghouse-Parson's turbines and generators. Power and light will be distributed through four sub-stations, one being located in each of the buildings supplied. The order calls for deliveries beginning Aug. 1 and the completed plant, it is hoped, will be ready for operation by the first of the year.

Fires:—

The machine shops of C. C. Hornsby, Krum, Tex., were damaged by fire March 5.

The plant of the Republic Construction Co., Lakeside avenue and East Fifty-third street, Cleveland, O., was damaged to the extent of $30,000 by fire March 19. The blaze was due to an explosion of a lamp in the engine room. The plant will be immediately rebuilt.

The Ralston Steel Car Co., Columbus, O., was damaged to the extent of $10,000 by a fire at its plant March 22. The loss is fully insured and operations at the plant have not been interfered with.